JPRS-EST-91-003
22 FEBRUARY 1991

Foreign Broadcast Information Service 50 ANNIVERSARY 1941 - 1991

JPRS Report

Science & Technology

Europe
Economic Competitiveness

FBIS 50th Anniversary Note

To Our Consumers:

This year the Foreign Broadcast Information Service observes its 50th anniversary.

The service, first called the Foreign Broadcast Monitoring Service, was established in 1941 prior to the U.S. entry into World War II. At the time, a number of U.S. Government officials were concerned about the content of foreign radio broadcasts—a relatively new means of conveying information and propaganda across borders. On their advice, President Franklin D. Roosevelt in late February 1941 allotted money from his emergency fund to institute the recording, translating, transcribing, and analyzing of selected foreign broadcasts for the U.S. Government. During World War II the service demonstrated that monitoring was a fast, economical, and reliable way to follow overseas developments.

Today the Foreign Broadcast Information Service provides its consumers throughout the federal government, according to their diverse official interests, with information from a broad range of foreign public media. FBIS information also is available to readers outside of the government, through the National Technical Information Service. Objectivity, accuracy, and timeliness are our production watchwords.

We members of the current staff of FBIS extend our thanks to consumers for their interest in FBIS products. To past staffers we extend our thanks for helping the service reach this anniversary year. At the same time, we pledge our continued commitment to providing a useful information service.

R. W. Manners
Director
Foreign Broadcast Information Service

Science & Technology

Europe

Economic Competitiveness

JPRS-EST-91-003 *22 February 1991*

CONTENTS

SCIENCE & TECHNOLOGY POLICY

European Space Chief Calls for Less Reliance on NASA

91WS0112B Munich HIGHTECH in German Dec 90 p 6

[Article by Jan Hoehn: "Separating From NASA"]

[Text] Against the background of continuing discussions of NASA's Moon and Mars plans, the scientific director of the European Space Agency (ESA) is asking for the establishment of an International Space Agency (ISA). "The Soviets and the Americans will surely be moving closer together," opined Professor Roger Bonnet in a HIGHTECH interview in Paris. "Consequently Europe and the rest of the world must react." The shoulder round is aimed chiefly at the space transport field. Europe, Japan, and perhaps China would join the ISA, while other countries like Brazil and Israel have, according to Bonnet, likewise already signalled their interest in joining this third group. Bonnet is, as ESA's top manager for scientific programs, one of the key figures on the European space scene.

After experiencing changes in NASA's positions, imposed by the U.S. Congress,—as in the case of the international space station Freedom—bonnet believes the ESA model to be better suited for the organization of an international space agency "which ought not be a space UNO." "ESA's decision-making process may be a bit awkward, but once a decision has been taken it is never regurgitated," argues the space manager. This promotes stability in medium- and long-term undertakings. "If the Americans were onboard as well, things would be uncertain," Bonnet asserts. Each year the U.S. Congress reconsiders, and, as in space, there are maneuvers.

Asked when ISA should be launched Bonnet responds: "As soon as possible. I believe that all potential members are ready right now, with the exception of the Americans." But that can change. Since last summer, a commission, chaired by Norman R. Augustine, the head of Martin Marietta, the U.S. armaments and aerospace concern, has been examining proposals for improving the efficiency and reorganizing NASA.

At the same time, a working group captained by ex-astronaut Thomas P. Stafford is assessing more than 3,000 proposals from U. S. universities, research institutes, and aerospace companies for the planned Moon and Mars missions. The American Institute of Aeronautics and Astronautics (AIAA) alone receive more than 500 suggestions from the ranks of its 44,000 members. The commission's report is scheduled to be in the White House and NASA by February or March 1991. President Bush has set the year 2019 as the target date for the landing of an astronaut on Mars.

According to Roger Bonnet, ESA is presently analyzing the American Moon and Mars plans, in order to ascertain the limits and possibilities of participation. "We shall stake out our role in the Moon venture in the coming months," says Bonnet and points to the "strong position of the Europeans" in the fields of astronomy, radioastronomy, and fusion. The greater amounts of helium on the Moon could, in the opinion of specialists on both sides of the Atlantic, open the door for safe fusion reactors. ESA's scientific director believes that the U.S. President's date for the Mars landing is "a bit optimistic." He estimates that the premiere of manned Mars flights will be in the time frame "between 2020 and 2030." Bonnet: And to date my forecasts in this field have always been pretty close to the mark."

Germany: 'Confidential' Report Shows Problems With Esprit Program

91WS0112A Munich HIGHTECH in German Dec 90 pp 86-88

[Article by Axel Winkelnkemper: "Initiation Fees in the Jungle"]

[Text] *Sand is grinding in the gears of the bureaucratic machinery of the Esprit Program, which was established to advance information technologies. A confidential report mercilessly reveals the grossest project failures.*

"Too often European resources invested in the development of technologies are wasted in half-hearted, short-lived projects that produce second-class products for limited national markets," complains Karl-Heinz Narjes, vice president of the commission of the EC. As a way out of this dilemma, Narjes pulls a putative joker out of his sleeve. To forearm the European Market for the challenge expected by 1993 in information technologies by American and Japanese competition, the Bonn envoy once again extolled almost imploringly the blessings of the Esprit Program [European Strategic Program for Research and Development in Information Technologies]—the largest EC research program by far with some 4.7 billion German marks [DM] to back it up.

This wasn't always the case. At the onset of the Esprit Program, the Federal Government—with Minister of Finance Gerhard Stoltenberg and Keeper of the Holy Grail of national research, Heinz Riesenhuber in the vanguard—were extremely skeptical about the ambitious EC undertaking. German politicians spread such a rotten mood throughout the country that Esprit proponents "were worried that Bonn would view their participation adversely," as Horst Huenke, the Esprit coordinating director in Brussels, recalls (see interview below).

Meanwhile the Esprit foundation for the establishment of a European high-tech armada has developed large cracks at least in the harsh reality of the contract awards practices. In the course of seven long years, a typical Brussels bureaucracy has taken over in the endless corridors of the Esprit building on the Avenue d'Auderghem. In the daily fight for the bounteous grants for

research and development, the "Big Twelve" (Siemens, Philips, SGS-Thomson & Co.) have always managed--through political influence and effective lobbying—to elbow the small- and medium-sized businesses out.

Small Business Is Often Left Empty Handed

Until the last round of bids, European small business had been left only 14 percent of the Esprit pot of gold. Moreover, German businesses were often left far behind the French and Italians.

The neighboring countries, primarily France, in the fullness of time, filled Brussels' executive floor with top, market-oriented people from the economy like, for example, Director General Michel Carpentier or Jean-Marie Cadiou, a former IBM manager. "Where are comparable top-echelon Germans to be found in the general directorate ?" EC critic, Professor Peter Atteslander, director of the Institute for Social Economy at Augsburg University, asks. Officials in Brussels are already joking about how the French pass the Esprit ball to their own businesses, while the German representatives, bathing in a Prussian sense of having performed their duty, pat each other on the back. Whoever does manage by clever maneuvering to fight the system successfully and participate in one of the numerous projects ranging from CIM [computer integrated manufacturing] developments to optoelectronics, gets bogged down in tedious project procedures and becomes irritated about the bad pay procedures.

According to a confidential paper of a task force of the topmost committees of the Esprit II Program, it is revealed that the participants themselves are increasingly becoming dissatisfied with the way things are going and especially with the results of the mammoth program. The critics are demanding the following remedial steps:

- more aggressive public relations work,
- broader distribution of the general and special results of projects,
- a constant flow of information to small and medium-sized businesses,
- better pay procedures,
- effective technology transfer,
- workshops aimed at potential marketing,
- actions to promote synergistic effects with cross-fertilization of projects.

In view of the economic relevance of information technologies, Esprit participants, after being in the program for seven years, are reporting "a deplorable state of affairs," as a leading development manager of the Munich Mannesmannn subsidiary of PCS Computer Systems claims. Nonetheless, since 1984 the Eurocrats in Brussels have poured over DM3 billion in research funds into the European information technologies industry—without any noteworthy success. As compared to Japan and the United States, the Europeans, as before, continue to bob around in the lower ranks.

Still, by the end of 1992 another DM3.1 billion will have trickled out of the EC pot of gold. Yet, this bounty appears to be justified. According to conservative estimates of responsible EC officials, information technologies will represent about 6.7 percent of the European GNP in 1993, far more than any other branch of industry. Moreover, almost two-thirds of the other economic sectors are dependent on info technologies for their efficiency and competitiveness.

Yet in late 1989, a blue-ribbon Esprit assessment committee complained in a confidential report that "program management could be improved in many aspects." The reason for the harsh criticism was the handling of contracts and payment procedures. Also, it was determined that the number of participants in a single project should not exceed six. In practice, however, the situation is quite different. In Project Atmosphere, where system engineering is involved in the program, responsible Esprit officials are trying despairingly to forge an effective techno team out 38 separate partners. "It simply cannot be managed," participant Guenter Koch, business manager of Freiburg 2i Industrial Informatics Company, concludes. It is clear from everyday experience that the participation of too many academic partners "gets no results."

The demand of critics for a clear market orientation and the economic utilization of resources remains valid. Furthermore, it was concluded that projects lasting five years were impractical. Under the pressure of numerous applications, the commission has taken repeatedly to cut back the proposed budget in order to achieve the highest possible success rate. As a result, the consortia are forced to cut back on the content of the work and often to cut off partners, often small businesses or universities. A Berlin high-tech businessman concludes: "In most cases the project suffers qualitatively."

Officials in Brussels Cause Waste

Clever companies get around this development by submitting highly inflated costs proposals for project programs, so as to be sure of getting the necessary amount in the end anyway. In the course of the punishing bureaucratic contract negotiations, "shotgun weddings often result." Clearly stated: The consortia are pressured to take on additional partners, which considerably reduces the chances of project success.

Because of the complicated contract awards process and the reporting system, a flourishing consultancy business has already developed. Whoever fails to have his development ideas presented to the Brussels officials at a friendly evening dinner long before the bids for the individuals projects are submitted, has hardly any real chance to come away with a piece of the Esprit bonbons. Business consultant Christian Baumhauer, business director of Arttic Consultants International with offices in Brussels and Paris, warns—not completely altruistically—mostly the smaller companies against going it alone: "A lot of "lubricating" fees have to be payed out

in Brussels." Just the formulation of a bid "proposal" costs at least DM50 thousand, without taking into account the enormous costs to follow during subsequent administrative procedures.

Psychological False Start for the German Participants

After six long years of the Esprit Program, even the BMFT [Federal Ministry for Research and Technology] in Bonn has finally recognized the need for supporting national candidates to the hilt—just as France has been doing from the beginning. In the DLR (German Research Facility for Air and Space, Inc.) in Cologne Porz, the relatively unknown Technical Communications Project Office has been concerned about the participation of small and medium-sized businesses in the Brussels contract awards rodeo. Office Director Horst Waeltring extols participation because of the so-called dual-use effect: "The companies gain priceless know-how through the intensive international contacts in searching out partners and through the structuring of the application procedures."

In the meantime, the Esprit-movers are already beginning to understand. Confronted with the realization that "projects without a technical director remain dead in the water" (Baumhauer), there are whispers on the executive floor in Brussels of pragmatic changes. Commencing next year, a responsible manager is to handle conflict resolution and program execution, at least in the consortium.

Sharp Competition To Participate

The topmost governor of German interests in the Esprit Program, Horst Huenke, director of the coordination office in Brussels, vouches for the technical effectiveness of European cooperation in this HIGHTECH interview.

HIGHTECH: Herr Huenke, you can now look back to seven years of experience with Esprit. To date, about DM3.1 billion have been ladled out of this pot of gold for various projects. Just what has the Esprit Program done for German business?

Huenke: Esprit has brought about Europe-wide cooperation, important new technologies, and new alliances. Businesses in the information technology industry have learned that in the domestic market there are many potential partners in research and development with whom it pays to cooperate.

HIGHTECH: But there were considerable initial difficulties. Even the BMFT does not view the past years as overwhelmingly positive. **Huenke:** Perceptions about supposed problems in Esprit differ. It is regrettably true that the Federal Government took a wait- and-see attitude initially. And that, unfortunately, had a negative psychological effect on the German participants at first. It took some time before everyone realized what opportunities cooperation offered and how sharp the competition to participate is.

HIGHTECH: Experts have levied the criticism that from the outset the committees were not filled with people who would have the interests of industry in mind, while the French have from the beginning filled key positions with absolutely top-flight, industry-minded people.

Huenke: Actually the French were very active. On the German side, there was talk of "program madness" in Brussels and warnings that the overhead costs of the businesses would rise precipitously. But these initial concerns have been overcome.

HIGHTECH: In the first phase of the program, the small and medium-sized businesses were left at the starting post, while about 86 percent of the resources flowed into the pockets of the large concerns. Did you not—by pemitting this to happen—violate some of the basic principles of the research program?

Huenke: I don't know where you got such figures. Esprit is indeed an instrument for investment R&D activities. That does limit the circle of participants because very small companies often simply do not have longer-term research plans. But we were surprised at just how attractive these R&D investments can be to the small- and medium-sized businesses as well. In the last bidding, small and large companies participated in about equally strong numbers.

HIGHTECH: Then how do you account for the bad reputation Esprit projects have and the mental reservations people have about them?

Huenke: One reason could be the often ambiguous attitude that exists in Germany vis a vis the EC. We have never been able to dispel the image that there was a preponderance of large enterprises. We try in our work to dismantle these prejudices and to make management as open as possible, even transparent. You can see that we have succeeded from the fact that our invitation for bids is oversubscribed to and from the quality of the projects and ensuing results.

HIGHTECH: The somewhat awkward procedures have not yet really improved, have they?

Huenke: We are constantly reviewing and improving our procedures; information is distributed in large quantities and in all languages. In addition, the projects are subjected to a review every six to 12 months by external specialists and their findings are in turn evaluated. Projects that are found to be defective, we terminate. Often, however, it is sufficient to alter the project plan and proceed anew.

HIGHTECH: And just how high is the flop rate?

Huenke: Real failures are very rare. We do not conclude contracts for the entire time, just half the time period. We have found that has a positive effect on the results.

HIGHTECH: Just how do the results of the program look?

Huenke: Esprit projects enjoy an outstanding success ratio. Over 300 specific results are presented in our yearly report. Let me take just one example. Project "Paper Face" brought about marked advances in optical character recognition for the German AEG [General Electric Company] participants. As a result, AEG received a contract for over DM300 million from the U.S. Postal Service.

Germany: Military Research Institutes Seek Civilian Customers

91WS0139A Duesseldorf VDI NACHRICHTEN in German 30 Nov 90 p 25

[Article by Bernd Eusemann: "Research Institutes Seek Civilian Customers"; first two paragraphs are VDI NACHRICHTEN introduction]

[Text] Karlsruhe, 30 Nov (VDI-N)—Funds are running out for arms specialists. Military technology is seeking alternative fields of activity.

Worldwide efforts to reduce political tensions are causing military developers to worry. Even research institutes are now trying to attract civilian customers. They want to tap new areas of application for knowledge previously concentrated on weapons problems.

What can died-in-the-wool arms experts do if the entire world disarms? The best thing would be for them to follow current trends and attempt to earn their money in the future with the general disarmament. That is precisely what research institutes that enjoyed a comparatively carefree existence in the financial security net of government arms suppliers during the cold war period are now doing under the somewhat abstract concept of "conversion."

"We have been doing this since the beginning of the 1970's," reports Dr. Hiltmar Schubert, director of the Fraunhofer Institute for Chemical Technology (ICT), attempting to present his institute as a pioneer in conversion, in other words "to slowly decrease research in the arms area." Virtually overnight, scientists who had previously depended on governmental and ministerial arms monopolists had to begin to acquire customers and research funds on their own. Although it began on a small scale, Schubert estimates the share of business "is currently about 20 percent."

About how much is that? The total budget of the Institute in Berghausen bei Karlsruhe was approximately 20.5 million German marks [DM] in 1989. Its major customer and consequently its major source of financing is the Federal Ministry of Defense, which alone accounts for a good three-fourths of this amount—the military past still defines the present. However, with a few budget items, the director notes the effects of ministerial economies on some 250 employees. He considers this reason enough for reorientation in personnel planning: Increasingly, former technical positions are being filled by scientists because they must not only perform research for industrial clients, they also have to obtain the orders.

Schubert is not alone in his concerns. What appears at first glance to be mostly a problem for the weapons industry and, therefore, primarily for small and middle-sized companies also applies to research institutes with particularly close ties to the military. In the Fraunhofer system alone, it affects a whole group of research institutes working on materials, explosives, or even night vision devices throughout Germany.

The push for change knows no national boundaries. "Even on the Soviet side, the will toward conversion is very strong," reports Schubert about his discussions with Russian politicians. With that country planning to reduce its arms to 60 percent in some four to five years, huge capacities will be freed up which must be directed into other areas, i.e., converted. In many cases, it will not be necessary to go far from the customary objective: The Soviet Union has, for example, inquired in the West about methods to dismantle and chop up tanks.

Cleanup Technology Still Lacking

The picture is similar for the waste materials left behind in Europe in large amounts by wars and decades of weapons buildup. There are former ammunition factories; there is old ammunition, even gas from World War I; there are large areas which have been used for military purposes for a long time and are contaminated with toxic and problematic materials. "This is going to become a gigantic problem to eliminate this contamination," believes Schubert who is looking for technology which is still largely lacking for the enormous cleanup.

But this is still a question of weapons, if only of eliminating them. What are the prospects for the complete conversion which will really transfer military knowledge to the civilian arena and lead creatively to new developments? Schubert mentions one research field: "Everything in the incineration field will be used in the civilian sector. That ranges from high pressure incineration for power generation to the problem of waste incineration."

Plastics constitute the second large area. Modern explosives are without exception plastics, and, in fact, filled plastics. Schubert knows that all this know-how comes from military research and is pleased with the interest of civilian users. "The market for filled plastics is increasing by 15 to 20 percent every year." Scientists are conducting research with a very practical orientation. They are concerned with issues of the perfecting of such plastics, i.e., with how the various components are effectively brought together. But they are also concerned with recycling issues. The automobile industry is an important customer.

Grenoble Area High-Tech R&D Concentration, Industrial Ramifications Reviewed

General Overview

91WS0117A Paris INDUSTRIES ET TECHNIQUES in French 9 Nov 90 pp 57-59

[Article by Christian Guyard: "Technology Transfer Champions"; first paragraph is INDUSTRIES ET TECHNIQUES introduction]

[Text] Eight thousand researchers! Only Ile-de-France's concentration exceeds Grenoble's. In the Alps region, this concentration synergizes with the general industrial activity. The traditional specialties are being enriched by expertise in the realm of materials, and are, in turn, contributing to the blossoming of an industrial development pole in biomedecine.

Viewed from a distance, the panorama that unfolds in the eastern Rhone-Alps region from the standpoint of research is clear. A very strong university environment around Grenoble, a university that is gaining its independence around Chambery. Industrially speaking, a sizable concentration in the region around Grenoble, and several large centers of industrial research, such as Vetrotex at Chambery, Air Liquide at Sassenage, Pechiney at St Jean de Maurienne, and CRITT's [Regional Center for Innovation and Technology Transfer].

Visible around Grenoble are the: CENG [Grenoble Nuclear Research Center], a major AEC [Atomic Energy Commission] center; CNRS [National Scientific Research Center]; INPG [National Polytechnic Institute at Grenoble]; and UJF [Joseph Fourier University]. Contact among researchers, and between researchers and industry, is rather better there than in the rest of France. But things are changing very rapidly. While the equation "Grenoble equals mathematics, electronics, and data processing" remains basically true, it is being enriched by materials technology, imaging technologies, and a biological and medical component that is posting a notable dynamic.

Around the end of 1989, the daily LIBERATION published a survey of European universities. INPG was rated the top French university. "But only the seventh European," Georges Lespinard, its president, hastens to add. "Our French rating is gratifying to us, as is our image among foreigners as a technological university."

INPG is currently restructuring its R&D activities. In a way, somewhat like going from an economy based on gathering—pecking away at research topics of seeming interest, and an occasional go at valorization—to one based on agriculture. This explains the creation of an Industrial Developments Department headed by Louis Balme, and an International Relations Department headed by G. Chartier.

In 1989, INPG's research budget totaled 308 million French francs [Fr], as follows: from the Ministry of Education Fr93 million; major organizations, local communities, and the EEC [European Economic Community] Fr83 million; CNRS Fr80 million; and industrial contracts (150 contracts per year, 20 patents) Fr52 million. This contracting rate has held steady since 1987.

Juridical Structure for 'Valorization' Ventures

From a financial standpoint, the principal industrial partners are Bull, Pechiney, SEP [European Propellant Company], and Thomson. At the other end of the spectrum are innovative and recently-created PMI's [small and medium-sized industries]. "INPG works only to a small extent with the PMI's," says G. Lespinard. This is more a matter of industrial demand, however, than one of choice.

INPG's industrial cooperation takes other forms, such as the creation of subsidiaries: the Hydraulic Laboratory of France (LHF) and DT2i. The LHF is a research facility owned 60 percent by Sogreah and 40 percent by INPG. Sogreah provides the premises and the test platform. INPG brings to the venture its instrumentation know-how and its theoretical knowledge. The investment totals Fr84 million. DT2i is a company the intent of which is to provide the missing link in the domain of industrial data processing, between a piece of research and a market demand. To say nothing of that unique success, Madylam [a laboratory specializing in research, development and valorization of advanced materials]. And a welter of cooperative ventures, such as the GIE [economic interest group(s)] between Bull and IMAG [Grenoble Institute for Applied Mathematics], and the one recently formed with Merlin Gerin in the field of electromagnetism and optoelectronics, with an annual budget of Fr5.3 million over a period of 4 years. Very soon, all these "valorization" ventures will have to be brought under a juridical structure, very likely a holding company, that is expected to be formed by the end of this year.

The UJF has also shifted into high gear. In 1982, SILUI [University-Industry Information and Liasion Service] was created and centered essentially on communication. In 1988, an incentives fund was created to promote technology transfers. In 1989, UJF's 119 research contracts represented Fr28.2 million, or 42.7 percent of UJF's resources. One third of this revenue came directly from enterprises, and 20 percent from the EEC. Here again, the presence of PMI's was very minor: 2 percent of the contracts in number, 10 percent in value. Francoise Sayetat, who heads SILUI, holds that cooperation with the industrialists should be handled through a private company, to better manage these exchanges with industry. But "valorization" appears to have reached a turning point, with: Grants in aid of industrial contracting; audits of research teams, aimed at forming a company—A Prime—to manufacture prototypes for biological and medical engineering; the forthcoming creation of a pilot workshop for surface-mounted device

components; and patent disclosures of its own once CNRS is no longer concerned. An office of consultants in the biosciences has also been created, with emphasis on three main areas: instrumentation, bioreagents, and the valorization of vegetal biomass.

Life Sciences and Techniques: On the Rise

A third major sector of research-industry relations in the Grenoble region is the CENG. The Center today fits perfectly into the pattern of the AEC reform announced by the Council of Ministers in October 1989, and plays an important role especially in the operational plans of the Agency's Directorate for Advanced Technlogies, on a budget of Fr1.4 billion, 60 percent of which is allocated to the Rhone-Alps region. The Center devotes approximately 25 percent of its budget to nuclear research (heat transfer and safety of fuels), 25 percent to basic research (physics of condensed matter, chemistry, and increasingly, biology), and the rest, hence a good half, to applied research other than nuclear. The GRETH [Heat-Exchangers Research Group], created in 1983, has been successful in carrying out its mission of putting industrialists in contact with each other, and research: 80 industrialists participate in and make advantageous use of its know-hows and installations (Esther platform with seven test circuits). A second structure, in the domain of materials, is the CEREM [Materials Study and Research Center], headed by Jean Spitz. Its strong suit is everything having to do with surfaces and exotic materials. The CEREM engages, of course, in very advanced research, and, since the beginning of 1990, has put in place an industrial interface workshop. "Some excellent contacts are already under way," says Pierre Mas, assistant manager of CENG, "but industrial circles are not yet fully aware of our capabilities." A third CENG activity is the LETI [Laboratory for Electronics and Data Processing Technology] division, devoted to electronics, instrumentation, and optronics. "An activity that employs 600 persons and represents a budget of Fr500 million," says Pierre Mas. The LETI will also be the coordinator of JESSICA in France. This program is designed to facilitate PMI access to modern electronics, and particularly ASIC's [application-specific integrated circuit(s)]. Three poles, or rather National Support Centers, will be created in France: in Paris; in the Southwest; and in the Rhone-Alps and Southeast region.

The domain of life sciences and techniques has the wind in its sails: At CENG, for example, 200 persons are working on this topic, only 50 of whom are from the AEC. This illustrates the importance of the Center's function as host. Four INSERM [National Institute of Health and Medical Research] units are housed here. More generally speaking, however, everything having to do with the biomedical is in a powered ascent at Grenoble at this time. According to a report devoted to GBM [biological and medical engineering], drawn up by Grenoble Isere Developpement, some 3,600 persons are currently engaged in the biomedical field, either in a laboratory or in a company, as their principal activity. While Grenoble's potential in this field is comparable to that of other large cities, it differs from the others by virtue of the ties it offers with the city's other strong fields, namely, physics, mathematics, electronics, and data processing.

A Vast Research Potential: 8,000 Persons

These are disciplines without which GBM could not exist. Grenoble's strong suits include: NMR [nuclear magnetic resonance], radioactive tracers, 3D imaging, and medical and surgical robots. Four major projects reflect this ascent: Installation of the Armed Forces Medical Service Research Center; the joint CENG-CNRS Proteine 2000 project; the UJF's Medicine, Data Processing, and Biology Research Center (C-MIB); and installation of the Synchrotron a portion of whose radiation will be devoted to biology (protein structural studies). A memorandum of agreement between CENG and CNRS has been signed relative to the creation of a multi-user (mainly INSERM) laboratory that is to be installed on their premises by 1992 alongside the CENG. It will use the computer center's Cray 2 ESRF [Electronic System Repair Facility].

And what about the PMI's in all of this? "Grenoble's problem is precisely its enormous research potential of 8,000 persons. The PMI's complain about the lack of information," says Jean Vimal of the Grenoble CCI [Industrial Development Center]. But things are going to change. In January 1991, two engineers will be hired to conduct a technological survey of the PMI's and evaluate their research needs. This Grenoble-initiated approach (supported by the Regional CCI) will take on a systemic character and is bound to benefit the entire Rhone Alpine community, which instituted the Presence Technologique network a few years ago. This network includes all the players in the technological transfers program: CCI, CRITT, technical centers, and the industrial relations delegates of the laboratories. The cycle is now completed. This network is being fostered by the Research and Technology Ministry delegate, Guy Bertholon, the Regional Council, ANVAR [National Agency for Valorization of Research], and CRCI [Regional Chamber of Commerce and Industry]. In the three departments, the organization of the CRITT's is adapted to the local fabric. Thus, one finds "generalists" in Savoie (where the network is fostered by an AEC representative) and Haute-Savoie, and other experts in such as surfaces, paper, etc. The network numbers around 80 persons in the Rhone-Alps region, including an Alpes du Nord component.

Downstream from all of this R&D are the seedbeds and other high-tech parks. Although the ZIRST [Zone for Scientific and Technical Innovation and Products] is still dynamic and unique, other high-tech zones have also come into being these past several years. These include: Hitella within the INP []; Astec for the renegades from the AEC (18 enterprises formed in 4 years); Savoie Technolac on the shores of Lake Bourget (650 jobs, 30 enterprises, and the University of Savoy); Centralp at Voreppe; the technology park at Isle d'Abeau, where

Lafarge Coppee is putting up a research center for cements; the technology park in the township of Gex; and the Archamps technology park. Isere wants to go further with its Tetrapole concept. Pierre Corbet, adviser to the chairman of the board, believes that "the 1990's will be personnel-intensive years, during which it will be necessary to attract, retain, and provide the personnel with a pleasant environment in which they can live as a community. All this is part of a global movement in search of a harmonious life-style, a movement that begins in the city and seeks out the culture of industrial and research structures.

[Box p 59]:

Training To Follow

The very rapid evolution of industry again raises the issue of old teachings versus the creation of new ones. This year, the INPG is putting up an eighth school, the first in France dedicated to industrial engineering. In addition to the INPG, the University of Social Sciences and a group of industries (Merlin Gerin, Bull, Hewlett Packard, Renault, Lyonnaise de Banque) are taking part in the sponsoring of this new diploma. The masters degrees offered at INPG are all being coordinated with the industries concerned: EDF [French Electric Power Company] for electric power networks, Hewlett Packard and the Ecole Superieure de Commerce for MITA [Marketing of Advanced Technologies], and Bull and Dassault for quality control of data processing systems. The intent of these education-industry relations is to foster technology transfers over the long term, as is already being done to some extent in the shorter term in the form of on-the-job training of students by industry: 1,000 a year for UJF, and 700 a year for INPG. To all of this must be added a European dimension, of course, with the creation of the Cluster network under the aegis of G. Lespinard, linking INPG, the Universities of Karlsruhe, Darmstadt, Eindhoven, Louvain (UCL), Trinity College of Dublin, Imperial College of London, Royal Institute of Technology at Stockholm, and Politecnic University of Turin.

LETI, CNET Connections

91WS0120A Paris INDUSTRIES ET TECHNIQUES in French 9 Nov 90 pp 66-67

[Article by Ridha Loukil: "France's First Microelectronics Concentration"; first paragraph is INDUSTRIES ET TECHNIQUES introduction]

[Text] There is a strong overlap between laboratories and industry in the development of microelectronics in Grenoble, as evidenced by the many technology transfers from LETI (Laboratory for Electronics and Data-Processing) and CNET (National Technical Training Center).

Microelectronics in the northern Alps provides a good example of broad symbiosis between education, research, and industry. It is a symbiosis that can be summed up for INPG [National Polytechnic Institute at Grenoble] laboratories in one figure: 60 to 70 percent. That is the proportion of their budgets excluding salaries that are funded by industrial contracts. The circuits and integrated systems laboratory, which specializes in the design of ASICs [application-specific integrated circuit] and CAD [computer aided design] tools, does better since it lives entirely from its dealings with small and medium business and industries. LETI, a joint laboratory of the CEA (Atomic Energy Commission) and Thomson, is another example. LETI is close to the industrial world both in its origins and its working methods. Its technological shop, which manufactures wafers at the request of research groups, develops the initial modules of new technological lines and makes the first attempt at assembly, working in two teams. Better still, the prototypes shop, which stabilizes new product lines and makes their first prototype circuits, operates in three teams, in order to remain profitable. "We are capable of responding quickly, with 10-day cycle times for production of prototypes," says Pierre Felix, head of LETI's microelectronics.

LETI's special industrial partners, SGS-Thomson and TMS, a Thomson-CSF subsidiary that makes military and space components, are naturally the prime beneficiaries of the technology transfers. About 70 people, the greater part of them from SGS-Thomson and the rest from TMS, work at LETI. Their collaboration has produced the technology for 16-bit Eprom memories, which will be produced in Agrate, Italy. The process transferred to the Franco-Italian company makes it possible to etch patterns 0.6 microns in size. While Pierre Felix tries to shrink the critical geometry to 0.5 microns using a new Line I photorepeater, he is already thinking about the 64-mbit Eprom, the project for which will be launched with SGS-Thomson in 1991. Moreover, LETI has three stabilized technological product lines that have reached the industrial stage. The first concerns a 1.2-micron analog CMOS process, transfered to SGS-Thomson in Agrate for telecommunications-dedicated circuits. The second is a 1.2-micron BiCmos technology for mixed digital-analog circuits being manufactured in a pilot run at the Franco-Italian company's Grenoble plant. The last involves a silicon-on-insulation technology, a line which is being developed in the military and space industries. Two 1.2-micron CMOS technologies have been transfered to TMS. Another regional electronics pillar, CNET, is also extremely active in technology transfer. For though its activity is directed first and foremost to meeting France Telecom's future components needs, the work necessarily involves industrial partners.

Transfers to Small and Medium Businesses Too

Alcatel, SGS-Thomson, and Matra MHS are among the most important of those partners. The Norbert-Segard Center has more than 70 technology transfers to its credit. Its director, Michel Camus, cites as an example the 1-micron CMOS process transfered to Matra MHS in 1989. "A French technology to a French company, proving the quality of research conducted in France."

The process has just been refined to 0.7 micron. It is ready to be transfered to Matra MHS. Another notable operation: the development of a deposit and etching technology combining multipolar plasma and microwaves. Alcatel is industrializing it on its reactors.

Large companies are not the only ones to benefit from these transfers. Anacad, a company employing 24 people working in ASICs in Meylan, owes its Eldo electrical simulator to CNET. This CAD system capable of simulating circuits with up to 35,000 MOS and 10,000 bipolar transistors, accounts for 30 percent of its gross sales. Technology transfer even spurs the creation of new companies. One example is Nextral, formed in 1983 to industrialize an ionic reactive etching machine developed at LETI. Drawn into the Alcatel fold, this small industrial company employs 20 and has sales of 20 million French francs [Fr].

Boxed Material—The Three Pillars of Microelectronics

LETI, CNET, and SGS-Thomson are the three pillars of microelectronics in the northern Alps. A joint CEA and Thomson laboratory created in 1967, LETI employs 650 people in Grenoble, 300 of them in microelectronics. It has invested Fr300 million in equipment in five years. It has 30 sales of industrial licenses, 40 current industrial research contracts, and about 50 patent applications a year to its credit. Inaugurated in 1981, the CNET's Norbert Segard Center in Meylan is among the top microelectronics labs in France. With a staff of 400, including 220 engineers and 100 PhDs, it develops the integrated circuits which will give rise to advanced telecommunications systems. Each year it files for about 25 patents and creates from 10 to 20 new circuits. Its pilot shop, which has a 1,400-square-meter clean room, treats a thousand silicon wafers a month, 200 of them for new products. The INPG and Joseph Fourier University round out this R&D potential at the basic research level, with 150 and 20 to 30 researchers respectively.

Next door to LETI, SGS-Thomson has an industrial site of 1,100 people, with 2,300 square meters of clean rooms and an advanced research center jointly operated with LETI. It produces 20,000 silicon wafers, or 20 million chips dedicated to telecommunications, video, etc., at the site.

JESSI, Microelectronics

91WS0120B Paris INDUSTRIES ET TECHNIQUES in French 9 Nov 90 pp 67-69

[Article by Ridha Loukil: "JESSI Viewed from Grenoble"; first paragraph is INDUSTRIES ET TECHNIQUES introduction]

[Text] Grenoble is putting its heart and soul into the European program JESSI [Joint European Submicron Silicon Initiative]. But researchers also have first-hand experience with its bottlenecks.

As France's first microelectronics hub, Grenoble is putting all its energies into Europe's battle for the microchip, that is, into the JESSI program. At LETI, an ultramodern building earmarked for JESSI is being erected. It represents an investment of F150 million, to which F250 will be added for equipment. A 2,000-square-meter clean room will be used for JESSI's most advanced work starting in 1991. The ultimate goal: to develop by 1998 0.25-micron CMOS technology within the Gressi consortium created with CNET. The CNRS (National Center for Scientific Research) and university laboratories will be involved in it through the GCIS (Silicon Integrated Circuit Group), which brings together their microelectronics teams with LETI and CNET. For Georges Kamarinos, laboratory director in Ensberg, JESSI will mean manna of F10 million a year. Compare this to the F20 million of the INPG's microelectronics activity today.

JESSI's second tool is the "Grenoble '92" industrial site under construction in Crolles. This F750 million center, shared by SGS-Thomson and CNET, will be utilized by the two partners in a 50-50 consortium to develop logical, analog, and mixed BiCmos Cmos product lines with critical geometry of 0.35 micron, in 1995. It is slated to to begin operation at the end of 1991 with 150 to 200 people. SGS-Thomson will exploit research findings in a high-volume plant built on the same site.

With Gressi and "Grenoble '92," CNET is equipping itself to successfully complete the ten JESSI projects in which it is involved. Also active in the Application and Basic Research components, it is the leader of the "electrical circuit simulation" project in which the Anacad company is taking part.

The First To Move to 8-Inch Technology

In its advance toward submicronic silicon, the Spectrum project for which it was chief contractor is an important step. The five-year European project carried out with 10 partners in the Esprit [European Strategic Program for Research and Development in Information Technologies] program ended this year with the development of a 1-micron CMOS technology. Its success has earned it an extension, in the form of the Access project, to move toward a 0.7-micron geometry. The targeted application is ASICs.

For LETI, involved with SGS-Thomson in the Memories project, JESSI is confirming its lead in certain niches, such as wafer confinement and optical lithography. Its new laboratory will be equipped with an integrated, deep ultraviolet, photolithoengraving line, as part of a research effort conducted with IBM, ASM, SGS-Thomson, Philips, and Siemens. The line will employ a resin that can be developed dry, using the "Desired" process of the Belgian company UCB. Pierre Felix has just successfully used the technique to produce a 0.2-micron contact detail.

LETI made a huge gamble when it invested in a new plant able to treat 6-to 8-inch wafers, at a time when the

industry is still satisfied with 4 to 6 inches. Its director Jacques Lacour hopes to attract more manufacturers that way. "We will be the first, after IBM, to move to 8-inch technology. I invite more European manufacturers to come take advantage of our lead," he says.

Another outcome of JESSI is the dissemination of the program's findings among small and medium businesses. The JESSICA program, run by LETI, is part of this effort, whose goal is to promote the use of ASICs in small and medium French businesses during the early stages of the Chip program. It is LETI's job to reach out to companies, identify their need, and design the solution. It is up to CIME, Inter-University Microelectronics Center, to train them in the design and manufacture of specific circuits. The center, which brings together the substantial design, manufacture, and integrated-circuit-testing tools of the Northern Alps University, is the spearhead of the national plan for a large-scale European project: that of training an additional 3,000 design engineers, 80 of them for France, yearly through the Esprit program. Also under the Esprit umbrella, the INPG is chief contractor for the Eurochip program which makes Grenoble one of the five European centers for manufacturing integrated circuits for Europe's universities and laboratories. About 700 different circuits are manufactured a year for over 100 research institutions in Europe: Good reason for Grenoble to feel encouraged in its ambitions to become the European hub of microelectronics.

That said, viewed from Grenoble, the JESSI program is not above reproach. Of the 46 projects that have been awarded the JESSI label, only two have really gotten off the ground: the Environment CAD project and the Memories project. The chief obstacle, according to all research officials, is funding, which has been slow in coming. "JESSI ends in 1996. When it was launched in 1988, financing was planned for an eight-year period. With the delays, it has been reduced to seven, and now six years," ironically comments Pierre Felix, in charge of microelectronics at LETI. "We are even losing money," he notes. "For traveling to Munich or Brussels for discussions costs time and money."

Jacques Lacour, LETI's director, does not hide his worries about this. "The financing procedure is a very sluggish machine that takes a long time to get going. It has not yet gotten started. But the first contracts should be coming in soon." At CNET, Roland Gerber, who coordinates the activities of the Norbert Segard Center in JESSI, also questions the organization of the program, which in his view is too ponderous to implement projects of any importance. As far as he is concerned, these hazards seriously compromise the program's future.

Uncertainties and Ambiguities Undermine Commitment

Will the British company ICL, bought out by Fujitsu, continue to participate in JESSI? Does Philips's withdrawal from the Memories project threaten the European program? These questions, still up in the air, are not the sort of thing to boost the morale of the troops. The Dutch group's defection makes financing problems tougher, which could further stretch the delays.

Making the climate in Grenoble even less conducive to commitment are the rumors at the INPG that CNET might abandon JESSI. The remarks of Michel Camus, director of the Norbert Segard Center, are ambiguous. "JESSI is a financing cow for manufacturers. CNET, a state organization, will have the same amount of funds to accomplish its mission whether it exists or not." It is true that Gressi, the consortium created by LETI, is for now only a paper agreement. Extricating oneself from it still seems possible. But it is hard to see how CNET could backpeddle on "Grenoble '92," a project in the midst of construction with SGS-Thomson in Crolles.

There is no lack of criticism from academic quarters either. "JESSI is not yet ready to go. We know what its overall mass is, but we don't know who will do what," says Georges Kamarinos, in charge of microelectronics at INPG. Though LETI's satisfaction about the role it plays in JESSI is stronger than any negatives, the frustration of the academics shows. "We were overlooked when the JESSI green book was written. CNET and LETI then grabbed the whole piece of cake earmarked for France. Our role in JESSI devolves from the contracts those two organizations are kind enough to throw our way. The result: Our level of participation is at least 10 times less than that of German universities," laments Georges Kamarinos.

Another fundamental problem is the limits of cooperation. In Pierre Felix's view, though JESSI at least rationalizes research in Europe by divvying up the work, the formula is still a timid one. "SGS-Thomson is building a factory near Grenoble. Siemens is in the process of doing the same thing near Hamburg. Those may be wasteful moves. The manufacturers could have chosen to set up a single joint factory where they would work together, like the Sematech consortium in the United States."

Finally, Georges Kamarinos finds JESSI too timid in content. "I am not sure that Europe can meet the Japanese challenge," he confides. This impression is shared by J. Lacour, who recommends boosting JESSI's ambitions.

Flat Screens

91WS0117B Paris INDUSTRIES ET TECHNIQUES in French 9 Nov 90 pp 71-73

[Article by Laurence Girard: "Manufacture of Flat Screens Set To Begin"; first paragraph is INDUSTRIES ET TECHNIQUES introduction]

[Text] Thomson-LCD and its liquid crystal display screens, Thomson-TTE and its plasma screens. SGS-Thomson and the CNET [National Telecommunications Studies Center] with control circuits. And LETI [Laboratory for Electronics and Data Processing Technology],

pioneer of technologies. Grenoble feels it has a European calling for flat screens, with a target: HDTV [high-definition TV].

Lending an air of Beaubourg to the prairie around Moirans is Thomson's new unit, anchored as of recent date in the Central Alps' zone of activity. Despite its tubular architecture, the unit has nothing whatever to do with tubes. On the contrary. Thomson-LCD marks the group's first step in the domain of the flat screen, which is expected to replace television's traditional cathode-ray tube. In the more or less long term...

The strategic importance of flat screens in the future of HDTV has been sufficiently proclaimed by Thomson. The result: The manna of HDTV has nourished the needs of the project, with largesse. Fr120 million have already been invested in this first step. Installation of the plant was completed in April, and the production process begun in July, one year following the start of construction. But lest there be mistaken expectations: The first screens to come off the production line are, for the time being, in no way concerned with HDTV applications.

A look back at the history of Thomson-LCD may be helpful from the standpoint of orientation. Its creation in 1989 combined into a single structure, on a 50/50 basis, TCE (Thomson Consumer Electronics) and Eurodisplay. The latter is owned by Sextant Avionique (80 percent) and VDO Luft (20 percent). Eurodisplay, the pre-existent core of the new venture, had been formed for the purpose of developing flat screens for use in military and civil aeronautics. To get under way, Eurodisplay opted for the General Electric technology. General Electric, for its part, before abandoning this activity, had coveted these same applications niches. With the entry of Thomson's consumer products division on the scene, Thomson-LCD is gearing up to perform the ballet-type split that is so dear to the French group, to play both sides of the coin, deeming that one and the same technological line of endeavor will respond to the needs of the military as well as of the general public.

The technology on which the venture has set its course is that of TFT's [thin-film transistors], active-matrix liquid crystals. A high degree of contrast, compatibility with video rates, color capabilities: The advantages of these screens are known. But so are their disadvantages. Screen size is limited, and production yields are extremely low. These screens are actually the equivalent of a large-scale integrated circuit with thousands, indeed millions, of components. Manufacturing such a product free of a single defective component is like betting against the odds. Moreover, the TFT technology falls short of what is required, by virtue of a complex process that penalizes its production output rate. In short—low production output, low yield, high cost—mass markets are still in the very distant future.

"A TFT color screen measuring 10 inches along the diagonal costs $1,500 today. This cost could be expected to drop to $500 by 1995. A cathode-ray tube screen of the same size costs $40. No real competition can be expected to develop prior to the year 2000. Consumer interest in this domain is a long-term interest. We consider the flat screen an indispensable strategic element toward the mastering of product innovation," says Thierry Robin, head of Thomson-LCD. Initially, beginning in 1991, Thomson-LCD will not be producing other than top-of-the-line products for military applications, in driblets. The first of these products will be 6-inch square screens, representing the level of industrialization attained by General Electric, and screens measuring 8 inches by 6 inches. But the production line is designed to accept formats measuring up to 16 inches.

The choice of Grenoble for this installation was not an innocent one.

With SGS-Thomson, which is developing the electronic drive circuitry for the screen, the CNET, which is developing the drivers for flat screens designed for the future videophone, and the teaming-up of the two under the European HDTV program, Grenoble is a likely candidate for the site of a European plant to produce flat screens, with sights set, in this case, on the general consumer market. Actually, Thomson and Philips think that the flat screen for direct viewing of HDTV is still a Utopia. An intermediate stage for the next five years would consist of developing projection systems, and, in this case, small-sized flat screens would suffice. The question remains open.

The march of flat-screen technology, at Grenoble, does not stop at the door of Thomson-LCD.

An Initial Market: Portable Microcomputers

To be found at Saint-Egreve is one of the cradles of plasma technology. With 20 years of expertise, Thomson Electronic Tubes has concentrated its activities on top-of-the-line military and industrial applications. Here again, high quality, small-scale batching, and high cost characterize production: Handcrafting for submarines and the Gendarmerie's radiocommunications network. This year, after four years of development, TTE's plasma panels have made an entry into the world of color that has attracted attention. To achieve this, it has been necessary to double the screen's definition. The first prototypes attained a size of 17 inches measured diagonally, with a definition of 512 x 512 pixels. The objective is to again double the screen's definition within the next two years, and to bring out 25-inch screens measured diagonally. Plasma lends itself more easily to large formats. It is at the level of color that plasma takes a beating. Today, the plasma screen is only trichrome, and its gray-scale levels are one of the subjects on which TTE must take to the floor. It goes without saying that this Thomson division would like very much to share in the HDTV funding and render plasma technology eligible. But for the time being, it is 100 percent dependent on Thomson-CSF.

This excitement surrounding flat screens, with sights set on HDTV, is not sparing of LETI. Leaning toward exotic solutions as it does, this AEC laboratory is beating the bushes, off the trodden trails, in search of new approaches that are not always to the liking of French and European industrialists. LETI has already experienced this: In the early 1980's, with a "clean color" technology baptized "BCE." It too consisted of LCD screens, but multiplexed, hence simpler than the TFT technology. After a fruitless search for partners, a "small" Japanese company of 3,000 employees, Stanley, specializing in automotive subcontracting, finally took the venturesome leap in 1988. Mass production of these screens is now scheduled to start around the beginning of 1991. And to find as its first market NEC's future portable color microcomputers. Meanwhile, the equipping of automobiles is the next stage being envisioned by Stanley.

LETI's New Adventure

At the same time, LETI has embarked on a new adventure. The technology in question, clearly positioned within the television screen niche, is of the micro-dot type, and attempts to combine the advantages of the flat screen with those of the conventional cathode-ray tube. Application of a voltage to a matrix of micro-dots emits electrons that excite the screen's phosphor dots. An initial feasibility test phase has yielded a 6-inch, 256 x 256 pixel screen. While Thomson is continuing this piece of research, at least in part—and is observing developments—the decision to invest in it on the scale of a clear intent has yet to be made.

Cryogenics

91WS0117C Paris INDUSTRIES ET TECHNIQUES in French 9 Nov 90 pp 81-82

[Article by Christian Guyard]

[Text] For those who might not know it, activities in the Rhone-Alps region also include aeronautics and space. True, they do not include the manufacturing of planes. But the activities of Air Liquide's Advanced Techniques Division (DTA) at Sassenage comprise those key points that other technologies fail to hurdle. Ariane could hardly lift off without the liquid hydrogen and liquid oxygen tanks built by this enterprise, and infrared sensing aboard a missile would not even rate as a viable topic of conversation were it not for knowing how to make liquid nitrogen in a matter of seconds. Similarly, in another domain, there would be no NMR [nuclear magnetic resonance] imaging without an efficient helium liquefier. And as for the Tore Supra Tokamak, it would still be a laboratory curiosity were it not for superfluid helium and liquid hydrogen.

These few examples illustrate the DTA's three sectors of activity: equipment involved in the production and use of liquid helium and liquid hydrogen; cryogenic equipment (gas bearings); and space techniques. Everything involving very-low-temperature cryogenics, in the neighborhood of absolute zero, and the obtaining of gas or of temperature levels under difficult conditions, interests the Sassenage-based enterprise. "The DTA's basic asset," says Robert Claveyrolat, its general manager, "is its total coverage of cryogenics as a whole, all the gases, all the techniques. This is a plus for our clients, because we know this particular domain and have the needed expertise in the design and development of the required equipment. In addition, we are lightly structured and can react very quickly."

One of the Sassenage-based enterprise's specialties is the manufacture of micro-generators of liquid nitrogen that are part of the infrared sensing devices carried by missiles. In just a matter of seconds, the gas stored in a mini-tank at 700 bars expands throughout a device and liquefies. This mini-cooler is carried by Mistral, Magic, and AC3G missiles.

Pressurization of Oxygen by Means of Helium

In the military domain, the DTA has also developed systems for in-flight production and supplying of oxygen to fighter pilots. "What limits the operating range of a fighter plane today are its lubricant and, above all, the pilot's oxygen supply. In-flight refueling has lessened the problems of fuel supply; but the pilot's oxygen supply is put aboard in liquid form prior to takeoff and its quantity is thereby limited," says M. Meilloux, who heads the development of OBOGS [On-Board Oxygen Generating System(s)]. These systems manufacture oxygen on board the aircraft and supply the pilot with air oxygen-enriched to the extent of between 45 and 95 percent. The air is bled from the jet's compressor and passed through a molecular-sieve system. "Besides providing the pilot with an unlimited operating range from the standpoint of oxygen supply, the system totally eliminates the resupply logistic, which presents an appreciable problem when units are on detached missions distant from their bases," says M. Meilloux.

Another system developed by the DTA, partly with funds of its own, is the OBIGGS [On-Board Inert Gas Generating System], a system for rendering inert the atmosphere inside fuel tanks, especially those of helicopters. Many aircraft were lost in Vietnam as a result of their fuel being set afire of by the impact of a projectile. An accident of this kind is impossible if the tank's atmosphere is inert. The OBIGGS uses membrane technology to produce 95-percent nitrogen from compressed air bled from the turbine. The system is capable of rendering inert the atmosphere of a 1,400-liter tank, is not very voluminous (15x15x50 cm), and weighs 4 kg. An OBIGGS-equipped helicopter will be demonstrated in flight at the Bourget Air Show in 1991.

Resupply Logistics and Flight-Duration Limitations Lifted

Another very important sector of DTA activity is space. If the prime contractorship for the hydrogen and oxygen storage and distribution system aboard Hermes has been

awarded to Air Liquide, it is because the company has acquired real experience in this domain, through its mass-production of Ariane cryogenic tanks. Since Ariane 1, all performance specifications have been consistently exceeded. These improvements in performance have flowed from structures have have been made lighter in weight, yielding in the case of Ariane 4 a payload gain of 100 kg. The Ariane 4+ version's tank weighs 675 kg for a fuel content of 10.7 tons. The thickness of the tank's aluminum alloy walls varies between 0.6 and 1.7 mm over a diameter of 2.6 m. But a change of guard is already under way. Near the end of 1989, Aerospatiale and Air Liquide signed a formal purchase contract for 50 cryogenic tanks for the third stage of Ariane 4. The two companies have created the Cryospace GIE [economic interest group] to develop the main tank of the H 155 cryogenic propellant stage: A change of scale, in that its diameter is 5.4 m and its length 25 m. It will contain 155 tons of propellants. The oxygen will be pressurized by helium instead of reheated oxygen: a pioneer technology that will yield a weight reduction gain of 360 kg and a challenge that will prove the feasibility of using liquid helium to advantage under the very special conditions of a rocket launch.

Biotechnology

91WS0117D Paris INDUSTRIES ET TECHNIQUES in French 9 Nov 90 p 112

[Article by Valerie Borde]

[Text] Installed in an ultramodern building at Saint-Julien-en-Genevois is the Pierre Fabre Laboratories' Immunology and Biotechnology Research Center. Pierre Fabres is the fourth largest French pharmaceutical group. Although native to the Castres region, Pierre Fabre has chosen this site, distant from its roots, because of the Genevois region's first-order scientific environment. The Center thus benefits from the proximity of Geneva, headquarters of the World Health Organization; of Lausanne, with its cancer research center; and of the universities and hospital centers in Lyon, Grenoble, and Geneva.

Parasitological Research Involving Antitoxoplasmosis Vaccine

The Center has been developing five main lines of research since the beginning of 1990: diagnostics, using the introduction of radioactive tracers into macrophages for scintillographic imaging of inflammatory and tumorous foci; the study of growth factors; treatment of infectious respiratory diseases by development of vaccines against the pneumococcus and the syncytial virus; treatment of sexually-transmissible diseases, such as prevention of recidivous vulvovaginal candidiases; and parasitological research involving antitoxoplasmosis vaccine.

The Center's scientific facilities are divided among eight laboratories: genetic engineering, immunology, biochemistry, analytical chemistry, virology, fermentation, extraction, and purification. The Center, all in one building, thus provides a complete operative chain extending from discovery of the compound to its exploitation. Its pilot production facilities will yield sufficient quantities of products for the carrying out of therapeutic tests culminating in authorization to market. One third of the Center consists of laboratories; the remaining two thirds are occupied by technical workplaces. It presently employs 60 persons, some 25 of whom are researchers. Total staffing is expected to total some 100 persons by the end of this year. Hans Binz, professor of immunology at the University of Zurich, famed for his work in cancer research, heads the Center. The buildings, designed by Architect Roger Taillibert, are shaped like a spearhead, symbolizing, according to Hubert Curien, minister of research and technology, "the spearhead of research as it pierces the unknown." One of its edges is devoted to research; the other to development and production.

Transputers

91WS0117E Paris INDUSTRIES ET TECHNIQUES in French 9 Nov 90 pp 128-129

[Article by Thierry Mahe: "Democratizing of Parallel Processing"]

[Text] The Archipel company was created in 1986, in the vicinity of Annecy, around a simple and fascinating project: the design and development of high-performance yet affordable parallel processing tools, to satisfy the needs of laboratories and integrators. This line of equipment, named Volvox, makes use of a family of cards based on transputers, and designed to provide added computing power to workstations and microcomputers. The transputer, originally conceived and developed by Inmos, a British company—today, in the orb of Thomson-SGS—is one of the very first microprocessors incorporating RISC [Reduced Instruction Set Computer] technology. It is admirably suited to the design of parallel architectures, since a chip can be connected to four other similar ones. The structure obtained is a grid whose transputers occupy the nodes, but which can be reconfigured at will from the software standpoint, to adapt the network's topology to the data's structure. Archipel's cards are designed for maximal modularity: The number of transputers is extensible to infinity by powers of two, the memory of each of them can be expanded to 32 Moctets [million 8-bit bytes], and present interconnection technologies ensure maximal flexibility. Furthermore, production of these cards is held to severe manufacturing standards, specifically those of EDF. The value-added content of the manufacturer's final product is not limited to the hardware aspect alone. Since the computer cannot function independently, a workstation must serve as its front end. The system has therefore also been provided with interfaces to the most widely-used operating systems: MS-DOS, MPW Mac2, OS/9, Unix BSD, and System V. Although the card is delivered "bare" from the standpoint of application software, a large family of compilers is

available for use with it. These include Fortran, Pascal, ADA, and Occam, the transputer's specific language.

Parallelism Rate of 100 Percent in Image Processing

Parallel processing is widely used in many applications. The Isere-based BSCA service company has fitted a realistic-reproduction software, and MC2, a high-performance character-recognition program, to this platform . Certain algorithms, particularly in image processing, enable attainment of a coefficient of parallelism close to 100 percent. Computing time is then inversely proportional to the number of processors. Many other applications have been developed in scientific processing, process management, and the processing of radar signals, using this machine.

France Telecom—which participates in the company's capital together with the AEC—is developing a signal processing application, using Volvox, that enables the isolating of a person's voice in a noisy environment.

Alain Rosset, who heads Archipel, plans to market a stand-alone station based on transputers some time in 1993. "To do this, we will have to strengthen our software know-how, so as to develop an operating system and a programming environment." Parallel architectures tend, by nature, to be tolerant of malfunctions. Alain Rosset does not rule out an eventual pursuit of this approach.

CORPORATE ALLIANCES

French Company Acquires German Electronics Firm

91P60091A Paris ELECTRONIQUE ACTUALITES in French 23 Nov 90 p 4

[Unattributed report: "Clemessy Assumes Control of Germany's Winkler"]

[Text] The Clemessy company (electric and electronic equipment) located in Mulhouse (upper Rhine) is assuming a 75 percent share of the Hannover-based Winkler Industrie und Elektrotechnik company (electronic equipment).

The Winkler company, which specializes in automation technology, has 70 employees, and in 1990 had a business turnover amounting to 10 million German marks [DM] (about 33 million francs [Fr]), and has a goal of DM17 million (Fr55 million) for 1993.

According to a spokesman for the Alsace company, "this assumption of control places us in a comfortable position among the German-speaking parts of Europe, where our group already owns three other industrial establishments—in Basel (Switzerland), and in Kehl and Munich (Germany) with some 450 professional employees. Last year it did Fr250 million worth of business."

Clemessy has over 3,000 employees, 1,800 of whom are in Mulhouse. In 1989 the company had a turnover of Fr1.8 billion (a 14 percent increase over 1988) with a net profit of Fr39.7 million (33 percent more than the Fr30 million in 1988).

Toshiba To Merge With Former East German Electronic Company

91MI0138 Duesseldorf HANDELSBLATT in German 14-15 Dec 90 p 22

[Text] The Trust Board has authorized independence for the Television Electronics Works GmbH (WF) in Berlin. The company that used to be the sole producer of color television picture tubes in the former GDR plans to enter negotiations with a view to participation by the Japanese electronics giant Toshiba before the end of this month.

The management regards its separation from its parent company, PTC Electronics AG, the former microelectronics combine, as an important milestone on the road toward success in international competition. WF had been the major earner in the former combine, accounting for about 50 percent of its overall income, and it is setting its future sights, especially in the color picture tube sector, on covering peak demands in the home electronics industry throughout Europe.

The Trust Board further gave its blessing to the purchase of modern Western manufacturing technology. Toshiba will supply manufacturing equipment worth 16 million German marks [DM] for state-of-the-art rectangular tubes. WF intends to provide equipment components worth an additional DM6 million as its own contribution. According to the WF management, this investment in the future could only be financed because, among other reasons, the Berlin company's bank, Deutsche Bank, had underwritten high risks.

The bank has issued a blank credit, with the result that the Trust Board and Deutsche Bank each now guarantees 50 percent of the multimillion-DM deal with Toshiba. The requisite letters of credit have still to be issued, but the company says that the delay is attributable to routine bureaucratic formalities.

The Japanese concern expressed its interest in a holding some time ago, and this decision by the Trust Board has now cleared the way for talks. Initial concrete negotiations are due to commence on 20 December.

According to the company management, the Berlin plant's picture tube production capacity (about 700,000 units) is almost fully committed for 1991. The optoelectronics department's order book does not look so good, however. Now that its traditional sales channels have dried up, the company must find itself a new position in the market. Sales income of about DM310 million is anticipated for the coming financial year.

In the meantime, the WF board has been returned. Juergen Wernicke is spokesman for the board, which is now made up of four members plus a director representing the company's employees.

Siemens, Matsushita To Cooperate in Electronics Component Market

91P60095P Berlin NACHRICHTENTECHNIK-ELEKTRONIK in German Nov 90 p 435

[Excerpts] In October 1989, Germany's Siemens and Matsushita of Japan founded the joint venture, Siemens Matsushita Components GmbH & Co KG. The goal of the partnership is ostensibly to bolster electronics market opportunities for the two partners via the manufacture of innovative products. Collaborative effort has been focused upon the manufacture of ceramic components and capacitors. The ceramic components include surface wave components, thermistors, varistors, and ferrite and ceramic capacitors. Manufacturing facilities for these items are located in Munich, Deutschlandsberg, and Bordeaux. Capacitor production is geared to power electronics, electrolytic capacitors, metallized plastic capacitors, styroflex and polypropylene capacitors, ceramic multilayered capacitors, anti-interference components, and shielded room technology. Production facilities for the capacitor segment are located in Heidenheim and Malaga. Initially, Siemens' share of the venture is 74.9 percent, the remainder falling to Matsushita Electronics Components. Eventually, the partners hope to arrive at a 50-50 split, with the majority of votes devolving to Siemens. Sales for 1990 are reckoned at 750 million German marks [DM] with DM1 billion expected in four years.

Italian, Japanese Joint Ventures Reported

Microelectronics

91MI0115A Turin MEDIA DUEMILA in Italian Nov 90 pp 105-106

[Text] The SGS-Thomson Microelectronics N.V. group, jointly controlled by IRI [Institute for the Reconstruction of Industry] Finmeccanica and the French company Thomson, has established a joint venture with the Japanese companies Kanematsu and Daisho. The agreement involves the design, manufacture, and marketing of printed circuits for electronic systems and the establishment of a new company named Saint-Pretec that will be controlled by the Japanese.

The printed microcircuits will be assembled in SGS-Thomson's plant in Maxville, near Nancy in France, which has been supplying dynamic memories to another Japanese company, OKI, one of the world's top 20 semiconductor manufacturers since 1988. The French group also signed a distribution agreement with the Japanese company Sanyo in late May.

The SGS-Thomson Microelectronics N.V. group currently ranks second in the European semiconductor industry after Philips. It is commited to an expansion strategy that is directed toward acquiring a five percent share of the world market by 1993, by increasing, among other things, its sales in Japan from the current $25 million to $450 million within five years; goals which underlie the agreements reached.

Monomers, Polymers

91MI0115B Milan ITALIA OGGI in Italian 22 Nov 90 pp 44

[Text] Montefluos, a company controlled by Ausimont (Montedison group), has signed a wide-ranging collaboration agreement with the Japanese company Central Glass for the development of new monomers and polymers.

These extremely high performance products will be developed using the two companies' technologies. Their applications will be primarily in the sector of coverings for the automobile, electronics, and building industries.

The agreement is part of Ausimont's development strategy. Ausimont is one of the world's leading companies in the field of special fluorinated materials and has recently taken over the Aatochem Thorofare (New Jersey) plant in the United Sates. Aatochem manufactures Kynar (polyvinylidene fluoride), a high performance material which is already widely used in coverings for the building industry worldwide.

Central Glass (a turnover of 1.5 trillion lire in 1989), which is controlled by Mitsui, Japan's "Agnelli" [Fiat], also operates with Montefluos in the fluorine sector (estimated turnover for 1990 is 700 billion lire) and produces car paints.

Energy, Environment

91MI0115C Milan ITALIA OGGI in Italian 28 Nov 90 pp 44

[Text] Eniricerche, the ENI [National Hydrocarbons Corporation] group's research company, and the Japanese gas company Osaka, which operates in the energy sector, signed a cooperation agreement yesterday. According to the joint statement issued by the two companies, the preliminary general agreement will be followed by specific agreements on single projects.

The two companies will exchange information and know how on energy, new materials, and environmental protection. Osaka Gas is one of the most important energy companies in Japan. The company supplies and distributes natural gas throughout the country and currently covers 30 percent of Japan's energy requirements.

Osaka Gas has already reached technical and scientific cooperation agreements with 18 companies in 11 countries. The agreement with Eniricerche is the first ever concluded with an Italian industrial group in strategic sectors such as energy and the environment.

ENI already has ongoing cooperation agreements in these sectors with other West and East European countries. The Italian company has research centers in Milan and Rome.

Italy: Implications of Fiat, CGE Alliance Discussed

91MI0111 Turin MEDIA DUEMILA in Italian Nov 90 pp 64-67

[Article by Giampiero Gramaglia: "Fiat-CGE, an Alliance Looking Toward the Future"]

[Text] The map of the European telecommunications industry is becoming more defined, in view of the completion, by 1992, of the large single internal market. Fiat, continental leader in the automotive sector and the largest private Italian company, has decided to create a "solid alliance" with a large private French company, the Compagnie Generale d'Electricite (CGE), European leader in the telecommunications field.

The strategic agreement between these two companies, which is aimed at achieving international competitiveness, counts on cross participation and the rationalization of their own industrial activities. There will also be exchanges of the members of their boards of directors.

Both important and well received on the continental level, this agreement has stimulated predictable controversy in Italy because when Fiat selected CGE it turned down a possible alliance with IRI [Institute for the Reconstruction of Industry]. Cesare Romiti, Fiat's managing director, explains the complex operation from a European perspective: "We are living in a market that is not going to spring into existence all at once in 1992, but one that is already being formed." The Turin company, on the other hand, has recently strongly internationalized its own presence: with Ford (United States) in the tractor sector and with Enasa (Spain) in the area of heavy vehicles.

Industry Minister Adolfo Battaglia comments: "European industrial policy is a serious matter, or it is being set by the companies themselves," even if "the purely free market approach that functioned in the past when it was a matter of removing national borders between Community countries does not function nearly as well today. This is true because the construction of [a single] Europe is faced with both the problems of integration with Eastern European countries and the problem of competition with other strong regions such as the United States and Japan."

The judgment of "neutral" observers sees the alliance that Fiat and CGE announced in early October as "a slap to the Italian government," this quote comes from an AFP (French Press Agency) article, "which tried until the end to encourage a solution that would combine in the telecommunications field Italtel-STET (Turin Telephone Finance Company) from the public sector and the Telettra company, the feather in Fiat's telecommunications cap." According to Reuter, "the combined forces" of Fiat and CGE "will compete" with IRI "for leadership on the Italian telecommunications market."

The importance of the Fiat-CGE agreement on the European market is demonstrated by the attention focused on its development by the antitrust authorities of the European Commission, especially the telecommunications sector. The new EEC regulations give the Commission the power to control mergers within the Community. This new alliance for European telecommunications might be the first chance to apply the antitrust regulations in effect since 21 September: In order to come under the control of the Brussels Executive Committee, mergers must have overall revenues from sales amounting to at least 5 billion European Currence Units [ECU] (one ECU equals about 1,500 lire) and two of the companies participating in the merger must have Community sales revenues of over ECU250 million. In addition, two-thirds of the revenues from each company must be earned in more than one of the twelve countries.

The merger was announced simultaneously in Madrid, Paris, and Turin, as if to emphasize its continental character. This agreement between Fiat and CGE has two aspects: financial and industrial. There is an exchange of shares between the two groups along with the integration of a series of manufacturing activities in four specific sectors (telecommunications, automobile components, railway material, and, finally, leading-edge technologies). In the near future, Fiat and CGE plan to start up a European holding company with stocks held equally to develop business together in state-of-the-art technologies: advanced materials, artificial intelligence, telecommunication services applied to means of transport, etc.

On the financial level, Fiat is purchasing six percent of CGE's stock or 6.4 million shares. Paying about 950 billion lire, it will become one of CGE's main shareholders, along with the Societe Generale. Simultaneously, CGE is acquiring approximately three percent of Fiat's capital, or 45 million ordinary shares, for a total value of 450 billion lire (with decidedly higher value than that of the stock exchange). It will become Fiat's second largest external shareholder, after the Italian commercial bank Mediobanca (3.13 percent of shares), and apart from holdings of the Agnelli family IFI (Italian Financial Institution) and IFIL [National Polytechnic Institute].

The main industrial feature of the Fiat-CGE agreement concerns telecommunications and consists of an operation concentrating Alcatel-Face, Alcatel's Italian branch, and Telettra, 90 percent held by Fiat. This will merge business into a single company in which Alcatel will have a majority holding. Fiat will keep 25 percent of the shares (this holding is added to the six percent holding in CGE). Strengthened by the Telettra agreement (both parties emphasized at the time of the announcement),

Alcatel, already a leader in Europe for the development and production of telecommunications systems, will become a world leader in the sector of broadcasting systems.

Telettra, which this year will reach 1.7 trillion lire in consolidated revenues from sales, was appraised under the agreement at approximately 2.5 trillion lire. Less than a month after the announcement of the agreement, the company took on a new general manager: Pierluigi Ferraoli, who had been at the company for several years, took over from Guido Vannucchi, who decided to "undertake," according to the message from the board of directors, "new professional activities."

Other features of the agreement regard negotiations for the transfer of the majority of shares of Fiat Ferroviaria Savigliano to the French company Alsthom and the creation of a European battery giant controlled by Magneti Marelli. In the former, they are completing the cession of 50.1 percent of Ferroviaria's capital to the French and British joint venture GEC-Alsthom; CGE holds 50 percent of the capital (Fiat will hold the remaining 49.9 percent).

In the latter, CGE will cede 50.1 percent of CEAC (European Battery Company, which combines Chloride Motive Power and Atsa-Tudor) to Fiat. CGE will continue to hold 48 percent of the capital.

The agreement between Fiat and CGE comes after the Turin company's lengthy, laborious contacts with the public company Italtel-STET of the Italian public holding company IRI. In the end, the people in charge at Fiat did, however, prefer to merge with a large private European partner rather than a state company. Dealings with the public company were riddled with problems and difficulties. Fiat and CGE's common goal is to reach a size that allows them to compete with the German company Siemens and the American company AT&T, the world leader which has a toehold in Italy thanks to an agreement with STET.

Fiat's managing director, Cesare Romiti, did, however, point out during his statements after the announcement of the agreement that the choice was not made "against IRI." This operation is, Romiti stated, "a strategic alliance for the long term, rather than a simple industrial agreement in the telecommunications sector." Romiti added: "This agreement will benefit the country. Reasoning in nationalistic terms does not make sense any more."

Well received in Europe, the operation immediately stimulated varying responses in Italy, due precisely to the possibility for different readings. The Stock Exchange greeted it with strong support; the unions denounced it, complaining that Italy is "the only major European country that does not have a national telecommunications center." The steering committee of IRI expressed their "regret that Fiat did not give due weight to the national interests that it called upon and brought to bear when acquiring Alfa Romeo, which was about to be purchased by Ford." For IRI, "the agreement between Fiat and CGE makes it more difficult to set up projects for national industrial centers, from centers for telecommunications to railways to aeronautics."

Minister Battaglia drew more general conclusions: "The private company is becoming international and the public company is becoming sterile in its isolation and small size. No one likes for this to happen, but it does, due to the direct pressure that political forces exert on public industrial realities.

[Box insert, page 65]

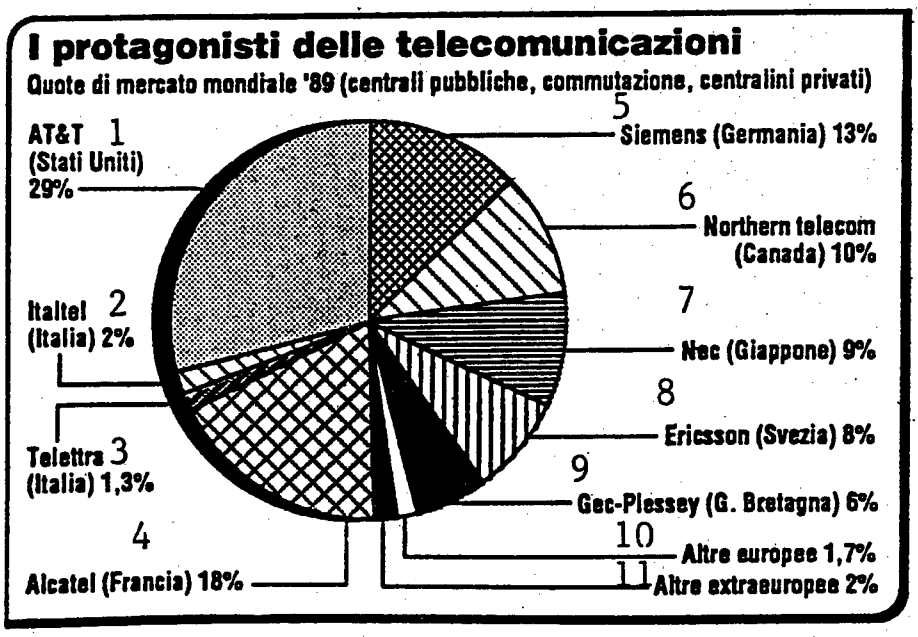
Fiat Companies Involved in the Operation

Telettra: Closed 1989 with revenues amounting to 1.62 trillion lire (50 percent of this was made abroad). It has 8,728 employees working in 13 plants (nine in Italy and four in Spain). Working profit came to 392 billion lire. Telettra is in second place among telecommunications industries in Italy (after Italtel) and in Spain. In both countries it is the sector leader in broadcasting systems and equipment. In this area, it is the fifth largest company in the world (with 4.5 percent of the market) after the American company AT&T, the Japanese company NEC, the French company Alcatel, and the German company Siemens. Telettra is specialized in the construction of microwave radio bridges, handling numerical signals, optical fiber broadcasting, and optoelectronic components.

Magneti Marelli: Specialized in the field of high technology components for automotive vehicles. In 1989, it showed proceeds of 3.864 trillion lire with a working profit of 240 billion. It has 40 plants (19 in Italy, 17 in Europe, and four in Central and South America) where 31,000 people work (14,500 of these work abroad). Production is broken down into six groups: electronics, instrumentation, lighting, electromechanics, motor and battery power supply. In this last group, 1990 sales revenues should reach approximately 337 billion lire. There are 1,800 people employed here.

Fiat Ferroviaria: Sales revenues in 1989 came to 325 billion lire (working profit 47 billion). This company has two plants in Italy that employ 1,558 people. It produces diesel and electric locomotives, railway cars, lightweight and conventional subways, electric trains, and diesel rail cars. It has been working in the "high speed" sector since the 1970's. It designed and constructed the "Pendolino," the variable attitude electric train capable of reaching 250 kilometers per hour. It recently developed two more powerful and sophisticated versions: the ETR 450 (which the State Railway is already using) and the ETR 500 (which will be used on the Italian railway network in the near future).

Telecommunications leaders. 1989 World Market Shares (public exchanges, switching, private telephone services)



Key: 1. AT&T (US) 29%—2. Italtel (Italy) 2% —3. Telettra (Italy) 1.33% —4. Alcatel (France) 18% —5. Siemens (Germany) 13% —6. Northern Telecom (Canada) 10%—7. NEC (Japan) 9%—8. Ericsson (Sweden) 8%—9. Gec-Plessey (UK) 6%—10. Other European countries 1.7%—11. Other companies outside Europe 2%

Broadcasting Leaders: 1989 Market Shares

	World	Europe	Italy	Spain
AT&T	14			
NEC	12			
Alcatel	9	20		
Siemens	7	16		
Telettra	4.5	9.8	33	46

Source: IL SOLE 24 ORE 5 October 1990

CORPORATE STRATEGIES

Airbus Industrie Gaining on Competition

91WS0132A Paris LES ECHOS in French 27 Dec 90 pp 1, 8

[Article by Gilles Senges: "Airbus Industrie Is Number Two Worldwide"; first two paragraphs are LES ECHOS leads]

[Text] Airbus Industrie, which celebrated its 20th birthday this year, is confirming its number two status in world aeronautics, behind Boeing. The European consortium booked 396 new orders this year, instead of the 270 it had been expecting. With new projects under development, Airbus is looking more and more like a challenger to Boeing, which beat its record this year for the monetary value of orders logged.

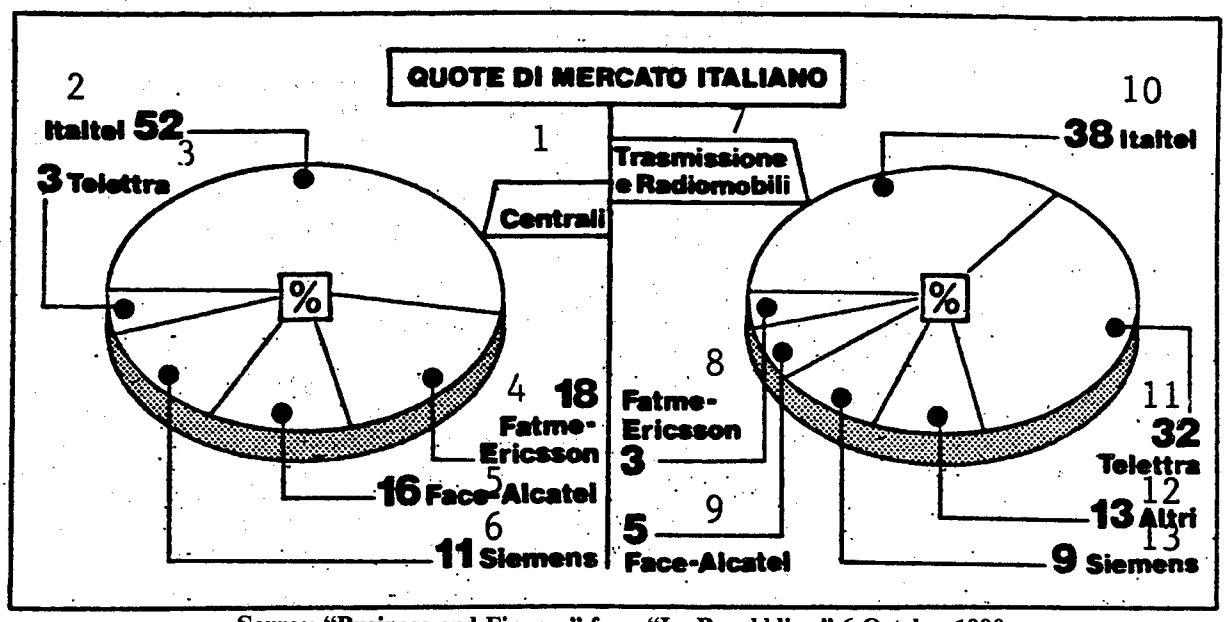
Airbus Confirms Its Number Two World Rank

The European consortium, now Boeing's leading rival, is preparing to compete with the U.S. firm across the board.

A four-month strike at British Aerospace cost it almost $300 million and defeated its goal of 138 deliveries in 1990. The establishment of an A321 assembly line in Germany caused a stir in Toulouse. The A320 Airbus once again became the topic of debate following an air catastrophe in Bangalore, India, that claimed 90 lives. The Americans renewed their attacks on purported "government aid" to the consortium, one again accused of unfair competition. In short, 1990 has been an eventful year for Airbus Industrie.

Yet, despite various stumbling blocks, the European aircraft builder is finishing the year with a flourish. It is landing its first long-range four-engine aircraft in Japan,

Italian Market Shares



Source: "Business and Finance" from "La Repubblica," 6 October 1990

Key: 1. Exchanges—2. Italtel 52—3. Telettra 3—4. Fatme-Ericsson 18—5. Face-Alcatel 16—6. Siemens 11—7. Broadcasting and Mobile Radios—8. Fatme-Ericsson 3—9. Face-Alcatel 5—10. Italtel 38—11. Telettra 32—12. Others 13—13. Siemens 9

thanks to All Nippon Airways' purchase agreement for 10 A340's, and it is preparing to close 1990 with orders for 396 new aircraft (421 in 1989), even though it only anticipated 270 at the beginning of the year. Several spectacular contracts, like the ones with Mexicana de Aviacion (36 A320's, including options), Swissair (52 A320's and A321's), and America West (118 A320's), have contributed to the tally.

Better still, although the undervaluation of the dollar has been particularly hard on the Airbus Industrie shareholder-partners, Airbus administrator and manager Jean Pierson has announced that, for the first time in its history, the consortium will show a profit, on revenues, this year again, of around $5 billion.

While the Anglo-German debate on its status continued to drag on into the foreseeable future, competition came into play for the first time on the occasion of the request for proposals for the A321, $180 million of whose development costs ($480 million) will be financed by B.E.I. [European Investment Bank]. The rest will be financed through a clever tax setup in Ireland (LES ECHOS 12 Oct) that does not appear to have made the French Treasury bat an eye.

Airbus Industrie, which has just celebrated its 20th birthday, is confirming its status as the number two firm in international aeronautics, which it gained in 1989 with an almost 30-percent share of the world market. "Boeing has the advantage of being the only firm in the large, long-range transport niche and of having the 747-400, which has been an extraordinary success," according to David Jennings, the consortium's marketing vice president. "If you eliminated this aircraft from its orders, we would be ahead of the American builder this year."

The race with Boeing appears to be getting tighter and tighter. First, there is the A330-A340 program (220 firm orders and over 400 with options), which the Seattle-based firm has just countered by launching the 777. "We will have to take it into account," David Jennings admitted, "but it is a late-comer on a market occupied by ourselves and McDonnell Douglas (MD-11). Between the two of us, we already have almost 900 purchase agreements in this category. It will be hard climbing onto the bandwagon."

Next, a number of projects under development at Airbus will be putting European aircraft on Boeing routes with greater and greater frequency. Initially, efforts will focus on development of the A330-A340 family, with an increase in their seating capacity. "We are talking with several companies," according to a sales office source. "By 1995 or 1996, it will probably be appropriate to offer derivatives."

600-800 Seat Aircraft Planned

A decision on this point may be made during the first quarter of 1991, leading to the construction of stretched versions. "This could interest both the Asians and the North Americans," David Jennings said. "We have a lot of faith in this family of aircraft, which will be continued until the next century."

The logical next step, recently proposed by Germany, is a 600-800 seat aircraft, about which Boeing is also making noise. "We have begun to reflect on the subject," we were told in Toulouse. "The project in question would be for the first decade of the 21st century."

The other development axis, a 130 seat aircraft that Airbus is working on for its A320 family, seems less certain for the moment, since it goes in the face of studies being conducted on the subject by the consortium shareholders (LES ECHOS 18 Dec). The European aircraft builder, which has just decided not to speed up production as initially planned owing the "latent crisis" in air transportation, is expecting fewer orders over the next three or four years. "But this should not have a big impact on the aeronautics industry, which has great number of orders to fill," we were told at Airbus, which currently has a thousand-aircraft delivery backlog.

Philips Lays Off 660

91WS0132B Paris LE MONDE in French 10 Jan 91 p 30

[Unattributed article: "Philips To Eliminate 660 Jobs in Components in France"]

[Text] Philips Composants will eliminate some 660 jobs in France at three sites in Caen, Evreux, and Dreux, according to the French subsidiary of the Dutch group. These component sector staff cuts follow the elimination of 800 jobs in consumer electronics and 500 in lighting announced last December as part of the financially troubled company's draconian restructuring (LE MONDE 13 Dec). A draft welfare plan will be officially presented at an extraordinary meeting of the central work's council on 16 January. Philips Composants employees 4,300 people in France.

SGS-Thomson Reorganizes Semiconductor Division

91WS0132C Paris LES ECHOS in French 27 Dec 90 p 6

[Text] SGS-Thomson, the European number two semiconductor manufacturer, whose management was recently affected by tragic events, has just created a new programmable products division. This unit, which has the group's highest deficit, handles the infamous "transputer" it inherited from Inmos, which has yet to prove itself commercially, together with semi-custom products (small series produced on request) and other MOS [Metal-Oxide Semiconductor] line chips.

The delicate task of getting this division back on its feet falls to Philippe Geyres, seconded at the strategic management level by Daniel Quessac, Pasquale Pistorio's old crony. The targeted recovery time is three years.

NEC To Market Philips Semiconductor

91WS0132D Paris LES ECHOS in French 27 Dec 90 p 6

[Text] Japan's NEC, the world's leading semiconductor manufacturer, will produce and market 11 semiconductor designs patented by the Netherlands' Philips group. The agreement allows the Japanese group to begin worldwide marketing as of January, with emphasis on Europe.

These chips are designed for consumer electronic products. Owing to the holidays, no comment was available on this new Euro-Japanese linkage, announced in Tokyo.

Citroen Launches Joint Venture in China

91WS0132E Paris LE MONDE in French 21 Dec 90 p 19

[Article by F.Ch.: "Citroen To Invest 4 Billion Francs in China"]

[Text] On 21 December, following three years of negotiations, Mr. Jacques Calvet, president of the PSA group and Automobiles Citroen, and Mr. Chen Qingtai, president of the Chinese firm SAW, signed a contract establishing a joint venture. Fireworks and music by Jean-Michel Jarre hailed the ceremony, which took place in the rooms of a major Parisian restaurant.

The Citroen project will reportedly result in the yearly production of 150,000 ZX cars, French manufacturer's latest model, at two plants in Wuhan and Xiangfan, two towns on the Yangtze River [location as published], which empties into the China Sea near Shanghai. Production startup is scheduled for 1995.

The Citroen investment, estimated at a total of 4 million French francs [Fr], is two-tiered. The French firm will supply 30 percent of the capital (set at Fr1.3 billion) of the joint venture with SAW, a Chinese firm that employs 276,000 persons and builds 135,000 trucks a year. A major French bank will reportedly participate in the venture to the tune of 5 percent of the Citroen interest.

Citroen has opted for caution on the rest of the investment. "Our investments can be modulated and have already been targeted," according to Mr. Calvet, who indicated that they would be staggered over the next three years depending on developments in the Chinese market. More important, the officials of the French firm have made fulfillment of the contract contingent not only on the traditional authorizations from the Chinese government, but also on the obtention of financing. In plain language, the next draft treaty between the French and Chinese governments will have to provide funding if these plans are to materialize.

Public Financing

This condition ties the joint venture to the evolution of relations between the two countries. Following the events in Tienanmen Square, the French government suspended implementation of the 1990 draft treaty, which is currently being renegotiated. A new agreement for 1991 should be discussed in the next three months.

Other French manufacturers with plans in China can only hope that, despite the condition set by Citroen, there will be something left over for them from the manna of French public financing.

SCIENCE & TECHNOLOGY POLICY

Hungary's New Science Policy Objectives Reevaluated

Official View

91WS0124A Budapest MAGYAR TUDOMANY in Hungarian Nov 90 pp 1328-1336

[Interview with Minister Ferenc Madl by Katalin Balazs, 4 September 1990: "Science Must Solve the Tasks of Science"]

[Text]

MAGYAR TUDOMANY: Mr. Minister! The government promised that in the first few months it would survey the problems of scientific research and define a program to handle the crisis, a program which will probably be needed by the end of 1991. To what extent have you oriented yourself in this area, does the government have a new science policy?

Madl: I have tried to orient myself. I read the expert materials prepared in regard to both scientific research and technical development. I consulted with the leaders affected, the ministers and experts. I also talked with the trade unions. I convened conferences which had the goal of finding our chief problems through mutual thinking and determining the chief tasks of each and of the government. New laws are needed almost everywhere in these areas—scientific research, higher education, scientific further training, and qualifications procedures, technical development, and innovation. These can be worked out only with regard to one another. Naturally what is behind the necessary laws is not an easy promise of relying on legal regulation but rather the challenge of the tasks—an epochal reordering and progress.

MAGYAR TUDOMANY: Does this mean that the government—deviating from what went before—wants to develop scientific research, higher education, and technical development in harmony with one another? Do all these areas belong to you within the government?

Madl: In the interest of acting with all possible wisdom and understanding the government created the Science Policy Committee. I am its leader. The members are the minister of culture and public education, the minister of finance, the president of the Hungarian Academy of Sciences, the chairman of the OMFB [National Technical Development Committee], and—depending on the theme up for discussion—the ministers affected.

MAGYAR TUDOMANY: In substance this is a cabinet?

Madl: Yes. This is a science policy cabinet which has the task of debating in advance every concrete decision the government brings in these areas, of preparing recommendations which the leader of the Committee—on his own responsibility—submits to the government. A Science Policy Council will continue to function. Its members are in part informed leaders delegated by the ministries and organs with national authority and in part those researchers and experts who have been active in these areas for a longer time in a professional way. The goal is to prepare analyses, surveys, and expert opinions in the several basic questions and to make evaluations or take stands by debating these.

MAGYAR TUDOMANY: To what extent has the Minister succeeded thus far in reviewing the chief problems in the areas mentioned? Where do you see the most serious problems?

Madl: On the basis of the conferences, consultations, and written materials mentioned above, and I have lived in this world for six years, I know the situation fairly well. It is both beautiful and sad. The nice side is that Hungarian science and scientists have a name in Europe and the world. Even despite the many unfavorable conditions it has been able and is able to show many results which represent a continuation of our best traditions, proving the intellectual and moral excellence of our talented people, ensuring even in hard times the good name of Hungarian science throughout the world.

The sad side of things is in those symptoms of crisis which have made and still make our life so difficult. Together with the Science Policy Committee we have tried to formulate the "situation" and the chief elements of "how to proceed." These are in the government program too. If we now turn our gaze to the sad side then we can say, for example, that although the ratio of researchers can be said to be very good among the European countries there is trouble with quality in many respects. The industrial research institutes within the national research network have not developed sufficiently—for well known reasons—with practice, do not serve industry in a sufficiently organic manner. At the same time, even in institutes dealing with basic research, where profit orientation should not be primary, the cultivation of science has been forced back and jobs which bring income but which are not so high level have come into the foreground.

Another question which came up is whether we need, under Hungarian conditions, such large institutes which exist in some areas. Their development followed their own laws and was often voluntaristic. It follows that in many cases they got far from the rational social needs, even in regard to quality. The universities hardly contributed to their sui generis task (at most in the form of "cross applications"). The capacity is there, but the output is not where it is needed. This is well known. The problems of assets, the parallel development of university and Academy networks, and the lack of proportion which can be experienced here represent a big problem.

MAGYAR TUDOMANY: There is a document before the Minister prepared for the government program. (Since the interview the government program has

appeared. — The editors) What are the chief elements of this program? What basic principles has the cabinet adopted, in what direction can one expect movement in these areas?

Madl: In general the "philosophy" of the government—and this is my personal opinion as well—is that the autonomy of the scientific workshops and of the institutions of higher learning must be respected in a far-reaching way. Science itself must recognize the tasks of science and its social responsibility therein. In regard to the government tasks pertaining to the cultivation of science, it too must rely on science. If necessary the tasks standing before the country in the area of scientific research, higher education, and technical development must be transformed into government decisions, carrying forward the opinions developed in the institutions and communities affected. In the spirit of what has been said I see the essence in the idea that science must solve the tasks of science.

MAGYAR TUDOMANY: The practical use of science, service to the economic reform, stood in the center of the economic policy of the past 20 years. The financing system and later those mechanisms which led to the development of numerous negative phenomena developed accordingly. Compared to this, what will be the relationship of this government to scientific research? Will current science policy break with the earlier view?

Madl: Yes, it will break with it. The basic principles of the science policy of the government are the freedom of scientific research (including the right of the researcher to choose problems freely, to solve them and publish the results freely), and the autonomy of the scientific educational and research sites. The government starts basically from the idea to which I already referred, that the autonomy of science extends even to finding answers to such questions as what is the role of science in society, what are its tasks, etc. The business of science policy is to aid in this, to make tools available, to support it with legislation. At the same time there may be and there are shorter and longer term goals (developmental priorities) which can be put in the foreground more emphatically through financing.

MAGYAR TUDOMANY: How should we understand this in regard to technical development?

Madl: The situation here will be optimal, the autonomy will be optimal (if I can use this concept here in a reinterpreted way), if the enterprises get to a level where they do not await the influencing and supporting role of the state but rather realize technical development themselves, using the results in market competition. The economic environment, the entire economic sphere, must be such that their interest in this is realized. The state has a role, a very important role, in a suitable development of this environment.

MAGYAR TUDOMANY: So you see technical development policy as part of economic policy? This also would be movement compared to the earlier view.

Madl: Yes. Independent of whether (this is a formal thing) technical development policy appears in the government program in the economic policy chapter or the industrial policy chapter or a separate chapter. The essence is to develop the economic environment, to make production competitive. It is important that the enterprises become capable of carrying out this task themselves—in their own interest. Another fundamental feature is that nowhere in the world are they left alone to do this. Governments carry out "assistance" technological policy activities with centralized assets—to varying degrees. It is this way in developed countries. Even the European Community organizes and finances large projects to encourage economic activity. Just the management apparatus for this consists of more than 600 persons in the Committee of the European Community, not even to speak of the internal administration of the member states. Here also there are and will be priorities for technical development supported at the government level. The experts will give advice on this. The government considers such central "assistance" necessary and if this is to be more effective the organizational and financing system must be transformed, made more flexible. We must develop a complex system of material support and competitions, but first of all, it "must be brought closer" to the economy, to the challenges of the market.

MAGYAR TUDOMANY: What is the situation in regard to higher education? To what extent has a uniform approach developed, for today the universities belong to various national organs?

Madl: Higher education does not belong to me, only to the extent that it is part of Hungarian scientific capacity. If higher education is to be modern then it must also be modern from the viewpoint of scientific research. So the Science Policy Committee deals with questions of higher education only in connection with science. I know well of course, and the Science Policy Committee sees it this way too, that it is difficult to separate things from one another here. But we are trying. One should do what is good and rational for the spheres affected, often one simply must do so.

MAGYAR TUDOMANY: How does the draft program on your desk handle the relationship between science and the universities?

Madl: There is already a certain consensus in the basic questions. Scientific research takes place today in the universities and in Academy and other research institutes. For the moment there is no reality to (and hardly any representative of) an idea according to which the institutes of the Academy should be separated from the Academy, higher education should be taken from the Ministry of Culture and all should be organized under a joint ministry—together with industrial research and technical development. A radical reorganization in this sense is not to be expected. I share the opinion that there is much value in the present structure; it would be superfluous to set up a necessarily bureaucratic new

organization. The reorganization might solve the problem of selection, but this would be at a price that no one wants to assume, with the tensions, much expense and extra reorganizational work. The government—the economic capacity of the country—cannot now give a great infusion to this area, but there are these two big systems here (institutes and universities) which must be tied together somehow. This could generate very great strength. The idea is to use government tools to encourage more serious cooperation between the research institutes and the universities. The Academy and other research institutes—in accordance with their possibilities—should take part in university instruction and postgraduate training while the university instructors, under certain conditions, should be able to work in the research institutes, making use of their better infrastructure. Certainly the legal frameworks for this should be created. Everything must be done in the interest of better cooperation between the universities and the research institutes.

MAGYAR TUDOMANY: Have you thought of supporting this goal via financing too? How will the financing system change? Can we expect that there will be more money for science?

Madl: I cannot yet give a concrete answer to your last question. I hope so, it is needed, I will do all I can. The trend is to increase, in financing, the supports which can be obtained via competitions. Everything the research institutes get, outside of basic supplies, they get via competitions. But the present competitions system should be reorganized—primarily the OTKA [National Scientific Research Fund]. Since the first secretary of the Academy is chairman of the OTKA, and because of other interrelationships, many justly believe that the OTKA means the Academy, although in principle this is not so. It was created by an earlier science policy committee resolution; it is not regulated by law. This obviously must be remedied. Today the OTKA is sustained only by the Central Technical Development Fund. In any case, a restructuring of the OTKA is under way—to give it the desired national function.

MAGYAR TUDOMANY: Are you thinking of creating a separate fund which the universities and research institutes can use jointly, expressly to support cooperation?

Madl: The OTKA is taking this into consideration. We would like to see to what extent the OTKA has played such an integrating role thus far. According to our plans the OTKA will be an independent fund, guaranteed by law. It will work within the committee system, in which the newly organized committees of the Academy may also play a significant role.

MAGYAR TUDOMANY: Don't you think that even then it will belong to the Academy? There is a contradiction here.

Madl: It may look that way, but the new competitions system will ensure broad professional publicity in judging the competitions, making decisions and evaluating the results. According to the thinking (if this thinking is realized by the law which will be passed) the Academy will not be the old Academy but rather a public, self-governing institutions in the bodies of which the most outstanding Hungarian researchers will take their place, those working in the universities and research institutes just like those working abroad or at other research sites.

MAGYAR TUDOMANY: How will you finance the OTKA hereafter, what relationship will the OTKA source have to the earlier budgetary support of the Academy institutes? The competitions principle also means hereafter a part of the budgetary support will be distributed via the OTKA, or will it go into some separate fund?

Madl: This is an important question, it affects the existence of the entire Academy research institute network. If these institutes were to get only basic supplies, beginning tomorrow, and had to enter a competition for everything else this would create a serious situation—in some of the cases certainly. Although the competitions system is the trend, this will not happen overnight. This will be solved only by a central rearrangement of the OTKA and the KMUFA [Central Technical Development Fund]. For both of them the ultimate goal is to conduct competitions, develop the competitive spirit and the monitoring role of the collectives. At the same time we would like to increase the bringing in of foreign assets, we would like to create more funds which could be competed for. We get lots of offers, partly credit and partly support, but sometimes the domestic receptiveness is missing.

MAGYAR TUDOMANY: Perhaps greater publicity could help here, because today these possibilities are not well known.

Madl: There are such problems too. There are offers, but these do not always reach the interested parties. In any case, on the basis of foreign experiences too, we trust that sources will be obtained for this sphere. We are taking steps now for better exploitation of these channels, in the interest of better information flow too. The government created an interministry committee for this purpose; we hope it will work successfully.

MAGYAR TUDOMANY: As the Minister also emphasized, we expect very much from international contacts in this area as well. Does this mean that in the development of the Hungarian institutional system and regulation we will try to fit into the European structures even in details?

Madl: It is my experience, and it is my opinion that a large part of Hungarian higher education, and the scientific research institutes are there in international life. In a certain sense it was Hungarian science which maintained the "European bridge," finding a path to both sides of a continent once split in two. Still, for the time being, we have the task of finding and tying together

everywhere the threads of cooperation. In recent times there has been a vast number of state or community level projects in the developed countries. These did not exist in Western Europe earlier, but today very many people manage these areas at both governmental and European community levels with gigantic assets. The professional apparatus is much more developed than here; they are used for international movement and have no language problems. Contacts have become more flexible and manysided in the unifying Europe, the readiness to cooperate has increased. We have our problems here!

MAGYAR TUDOMANY: Does it not follow from all this that in this area we must create in Hungary also the organizational conditions for government level cooperation? The organizational and expert background are both missing today.

Madl: They are missing at all levels, at the level of autonomous organizations as well. The foreign language knowledge of researchers and teachers is not adequate—recognizing the many outstanding exceptions—and this can be remedied only slowly. We are trying to strengthen international contacts at the government level where possible. We would like to get closer to the programs of the European Community which we mentioned. The Trade and Cooperation Agreement signed with the European Community in 1988 formulates this intention as well. But the Community now is faced with the problem of how to extend these programs beyond the member states. TEMPUS [Trans-European Mobility Scheme for University Students], ERASMUS [European Action Scheme for the Mobility of University Students], EUREKA [European Research Coordination Agency], and ESPRIT [European Strategic Program for Research and Development in Information Technologies] were not contemplated for countries outside the member states. Despite this we are trying to be present continually and get support for Hungary.

MAGYAR TUDOMANY: Whose task is this organizationally?

Madl: I believe that what is desirable (autonomy!) is for the appropriate organizations and scientific workshops to build up their international contacts in their own areas, where necessary action will be taken at the government level too. This includes joining the organizations of the European Community, where there are government level mechanisms, the goal of which is the already mentioned "assistance" for the otherwise autonomous processes of research and technical development.

MAGYAR TUDOMANY: We mentioned above the need to rearrange the KMUFA in connection with financing and technical development. In past months the government withdrew 2 billion forints from the KMUFA to reduce the budgetary deficit. In regard to its economic content this step passes as confiscation. What is the opinion of the Minister about this? Could such a thing happen in the future too, and how do you imagine the financing of the government technology policy?

Madl: This withdrawal took place due to the serious situation of the country (of the budget). Unfortunately I cannot personally guarantee (and it would be immodest to say so) that this will not happen again, but we will try to protect the sources for technical development. For the time being we want to maintain the KMUFA, although in the long run this must be built into the budget. Today, it appears, there is no way to do this. The budget could not bear it, and we cannot raise the tax burdens now.

MAGYAR TUDOMANY: What can the OMFB do in this situation? How can it meet its contractual obligations?

Madl: In the case of contractual obligations the budget will make it up. The KMUFA is generated constantly, one can even imagine the miracle that more will be generated than was planned at the beginning of the year. The government does not intend to withdraw anything next year—if only the economy does not get into a "life endangering" situation.

MAGYAR TUDOMANY: Mr. Minister, I would like to know your position in organizational questions too. What is your thinking about the Academy? Will there be an Academy law? If so, with what content?

Madl: The government supports the aspiration of the Academy to become an autonomous public body. If there is a consensus in the world of science, and if it crystalizes in this form the government will carry it on in the form of a draft law. The status of the institutional network, and the autonomy of the institutes within the autonomy of the Academy, must be settled.

MAGYAR TUDOMANY: Earlier there was an Academy conception according to which the Academy would become an independent autonomous public body, the property subject to the rearrangement would become the property of this public body, which would mean that the network of institutions would pass from the earlier state property to being the property of the body of the Academy. Is there still talk of this?

Madl: In essence there is, the outlines of this are firming up, but what final form it will take I could not say today. According to the self-government idea—and this pertains to local self-government today too—the property is not state property but rather the property of the local self-government. In this way the Academy too would own property, as it becomes the self-government body of science. In accordance with this concept the draft law is being formulated within the body of the Academy. As a more general consensus is reached—e.g., via the Science Policy Committee and the government to the National Assembly—the viewpoints and contributions of a number of spheres may form and enrich the picture.

MAGYAR TUDOMANY: Do you not see a contradiction in the fact that the election of self-government members and of the body of the Academy require different viewpoints and mechanisms? Academy membership is awarded by the body on the basis of scientific

merit, but the self-government members are elected on the basis of managerial abilities and the trust of those affected—the researchers.

Madl: This is true, but in the new conception, insofar as I can judge it, the Academy will be the national self-government body not only of the academicians but of every Hungarian scientific researcher—as I mentioned earlier. But your question is a just one, for the Academy is on the one hand a body which renews itself on the basis of merit (by the election of new members by those already in it) and is on the other hand an organized and directed institutional network within a sort of hierarchical administrative system, while the essence of self-government would be election and initiative from below. This duality must be resolved. One must really see here a contradictory tension. One must trust that the creative antagonistic forces will find a solution within the frameworks of the law. It is possible that I have put this very abstractly, but those in the know will understand what I wanted to say. But what can be considered certain according to general conviction and opinion is that the law decree concerning the Academy must be invalidated, so the authoritative function of the Central Office of the MTA [Hungarian Academy of Sciences] will end. With the increase in autonomy a good part of the official functions will transfer to the bodies and institutes, while a secretariat will take over the necessary administrative tasks. There are similar examples in the West too.

MAGYAR TUDOMANY: In the expert materials last year it was often formulated that one of the most serious problems of the institutes and universities was interest, as a result of which basic research and scientific work got mixed with activities of an enterprise character. Today the TDDSZ formulates it this way—research and development must be separated. When formulating the technology policy ideas I suggested techniques which would encourage making profit oriented activities into undertakings with an organizational separation from scientific research. What is the government position about this problem?

Madl: This is an important part of our thinking, in connection with questions of researcher quality and selection. The government supports a transformation process in which those research institute departments which deal primarily with adaptation and technical development will have a closer link to the economic sphere, but could remain in the institutes, not split off from basic research. The details in this area also must be worked out yet.

MAGYAR TUDOMANY: Sticking strictly to the question of quality and level, the question of the wage level is linked to the above problem. The low incomes have a significant role in the fact that researchers deal not only with science. Can we expect improvement in this area?

Madl: Under the influence of the Eastern European model the wage level of the research institutes and universities, compared to other branches, is very low. This is a product of four decades of "equalization." In the given economic situation this involves a paralyzing inertia. Restoring a value system and creating the material recognition which has developed in developed countries would require a pay increase of more than 100 percent. I would like it if this long-range goal would appear in the final text of the government program, but I do not know if this can be undertaken responsibly in the short term, whether the economy and the budget could bear it. The government must declare its intention to produce a significant change in this area. This relatively greater recognition must be restored, because when managing human values the present situation means schizophrenia and waste on one side (society spends hundreds of thousands during the 20 to 25 year training period to "produce" highly qualified experts and then pays them as if they had only been taught to read and write). On the other side it leads to frustration, which then encourages people objectively to abandon their careers. It is lucky that science and teaching involve vocation and devotion, passion and determination. As a minister I dare say this only in parentheses, but somewhere I deeply believe, and it is good to know, that in difficult times this can help, can make up somewhat for the lack of physical conditions. But to put it "officially" this year's budget cannot guarantee a significant improvement; we would like to have one in the future. It is true that even a 30 percent raise would mean only keeping up with the wage level, and while I mention this 30 percent now, and many mention this as what is needed, what can be done in the future in light of this catastrophic year (the empty cashboxes, the oil prices, the drought, I do not want to continue the list) will be seen only in the course of preparing next year's budget. One thing is certain, the trend which neglected science, and its representatives must be turned around.

MAGYAR TUDOMANY: There has also been in recent months a sharp debate concerning scientific qualifications. This is an area in which the Minister was active earlier. We would like to hear your personal opinion in the question of qualifications.

Madl: It appears that a consensus is maturing that scientific further training and qualification should be left fundamentally to the universities, with the intensive cooperation of the research institutes, the Academy, and other research sites. The TMB [Committee on Scientific Qualifications] and the Academy are studying this question and a proposal can be expected by the end of September. In my personal opinion qualification must be returned to the universities completely in the long run. Since science has been science and universities have been universities the universities have trained the "apprentices" and recognized their own masters. There has been no exception to this since, this is true today everywhere in the world. Outside of this region other institutions nowhere award this qualification. It is another question that academies and other professional scientific institutions and societies offer membership to those considered worthy of it, but this is not a scientific

degree, it is scientific recognition, a social rank. This—awarding degrees in the universities—would give a clear picture, would mean that the universities had quality, dignity, prestige. It is a question, however, whether in the present Hungarian situation it is possible or necessary to do this. Opinions here are divided, primarily in connection with awarding the "great doctor" degree. However this may be, the laws concerning qualification, the Academy, and higher education must be consistent in this. Rather great agreement appears to be developing that the candidate's degree, under an appropriate name, must be given over to the universities.

MAGYAR TUDOMANY: Under what name? Do you favor the Anglo-Saxon or German system?

Madl: In my opinion the two tiered system is the more rational, this being the most general, and also the earlier Hungarian practice. But, it is not the name that is important. There are opinions that the university doctor stage (rank, degree) has a function outside of any possible title the candidate might be achieving. The opinions of most of those with degrees (more than 10,000 people) are divided as well. In many places the state of the universities, their personal preparedness, does not meet the requirements of really demanding scientific qualification. There are many departments without a sufficient number of people so qualified. This circumstance obviously influences the cooperation of the schools and of the research institutes. The question is whether, with the present difficulties, the doctor's degree should go to the universities hic et nunc. If not, where will the qualification be made? There are those who propose that the Academy take it over, others that it should remain in the hands of a committee like the TMB. If the Academy is not to be an autonomous public body then it cannot take it over because—having no public law function—it will not have and cannot have the right to do so. Only as a public body could it get state licenses, or it must be stated that a nonstate institution also is authorized to award generally accepted scientific degrees. Without this the Committee on Scientific Qualifications (or some mutation of it) remains, against which, in my opinion, a large part of the attacks are groundless—at least since I have had closer acquaintance with it. Where it can be blamed is that it operated in a disjunctive manner, isolated from the universities (from the institutions of the scientific sphere). Although in the sense of organizational theory it was close to an optimum (national scale, a two-stage decision mechanism, legal guarantees), and this also was a fault of it. The other deficiencies derived from the "shoddiness" of the social environment. Up to now the TMB has resisted having all its activity passed to the Academy, because then the universities would have been finally excluded from the "chain." Now we have to attain some sort of sensible and operable synthesis. Obviously this must be created in the forums of scientific public life; the government and the parliament road can follow this.

MAGYAR TUDOMANY: Permit me finally a personal question. What does the task to which you have been called in the government mean in your life? You are a university professor, you have retained your university position, you are a man of science. What do you expect from this function?

Madl: I did not seek this function, I felt very well at the university and do so now, and I worked a great deal up to now too. They convinced me (until I believed that it was not from vanity that I believed it) that I was needed here, and now I am trying to come up to the task. This means that I work 18 hours a day. Extra burdens are always being put upon me, most recently the Property Agency. What I originally undertook was contacts with the European and international organizations. I had done research on this, I had quite a bit of international experience, I accepted the task of putting this into practice. I am convinced that this—science and technical development especially—is a very important area. In this respect the work is no problem, because I do it from the heart. The problem is that I am facing many difficulties, and this can easily cause frustration. One must think in long-range ways in science policy, I try to do this, and a man must believe that there is sense in what he is doing. This is especially difficult with all the criticism the government is getting. This does not bother me because I am fundamentally convinced of the historic value of the current economic, social, and political processes, of the correctness of the main line, and the democratically elected government of the new Hungary which has been called on to follow this main line. As I see it everyone in the government is trying in his own area to get us out of our difficult situation. Obviously years will be needed for a full transformation and for the path to turn upward, and the efforts of everyone are needed, whoever is in the government. For my part I am doing what I can for it. Not primarily for the government, but with the government—as long as it follows the line it has taken—for the cause. Because whatever the personal fate of the ten or so people in the government is is a question of the last rank. But it would be a far-reaching problem if the government could not fulfill the mission it has undertaken, because this could endanger the cause. In this context I view my task very positively for the time being, it requires honor and devotion, it promises many challenges and experiences, it fills one with responsibility and involves the anguish and the control of doubt. It calls one to complex thinking and consistent deeds, in a word, despite all its difficulty it is a human, spiritual experience. So much for your personal question.

MAGYAR TUDOMANY: Thank you for the interview.

Issues, Opinions

91WS0124B Budapest MAGYAR TUDOMANY in Hungarian Nov 90 pp 1337-1345

[Article by Katalin Balazs: "The Debate About Science Policy: Concepts and Opinions"]

[Text] We have been debating more and more recently: What will happen with Hungarian science, with the

universities, how can technical development be made more effective? As a result of the constantly decreasing resources in the 1980's, the increasing inflation, and the political and economic crisis, the old contradictions and conflicts of interest have deepened. Some of the research institutes are close to a life endangering crisis; the material conditions and operating conditions of the universities are less and less able to stand comparison to European conditions. The innovative performance of the Hungarian economy has not justified the science policy course now more than two decades old. A change is needed not only because of the changes in the political and economic system but also because of the contradictions and problems which have piled up in the areas indicated. A number of opinions were formulated last year about the status and future of science, higher education, and technical development. The concepts developed in the months forming the future displayed not merely professional opinions but also various interests. The institutions, the communities of teachers and researchers, the interest representation organs and the leading bodies seek their places in the epochal changes to be expected. Today—in August 1990—we have not yet reached the "future," and the situation (unfortunately) is no less unformed than a few months earlier.

In June the Science Policy Work Committee of the TDDSZ organized a forum at the Ratkai Club with the goal of bringing together the representatives of the various opinions, to aid open, constructive debate, bringing up and discussing basic questions and questions of detail, releasing for debate their science policy positions. Last year expert materials were prepared at the request of the since abolished Science Policy Collegium of the government. This was done in five work committees, in the pastures of the Academy, in the universities, in the organization of the OMFB [National Technical Development Committee], from the experts of the parties, and at the interest representation organs. In a period of systemic and governmental change every study was written with the goal of offering advice and professional arguments for the new government policy.

The several volume document formulating the opinions and concepts contains positions which are very close to one another in basic principles and in evaluating the situation. In most questions the solutions proposed are similar, even in details, but the emphasis is not the same. So it is difficult to group and analyze the views. The real differences, opinions opposed to one another, affect interests directly, involve material support and organizational, institutional questions. The theme is so broad and has so many branches that on the basis of the documents and what was said at the forum it is possible only to illuminate the positions and not to present them fully. I must add that in the changing environment, and amidst the changing power relationships the positions of those affected are changing too. What can be set down today is the trend of the views, ways of thinking and interests, what is "in the air" in this area today.

Situation Evaluation and Basic Principles

What is it on which virtually all of us agree?

As a result of decreasing expenditures the research institutes and universities have gotten into a critical situation. The regime neglected education and research and the other branches of the infrastructure in general; the reduction in budgetary expenditures and the increasing inflationary pressure make questionable the high level continuation of basic activity. Equipment for and the material level (infrastructure) of the universities and research sites deteriorated by an order of magnitude in the past 10 years. The wage level less and less offers a way to ensure the intellectual life needed for high level intellectual activity, does not make it possible for teachers and researchers to concentrate on their basic tasks.

Today not only does the level of state financing represent a problem, the result of the accomodation process which took place in recent decades does so also. As a result of the low wage level the second jobs and side jobs, and the earning of other supplementary incomes have scattered the basic activity. At the institutional level, due to the undertaking of contract work and the producing and service activity and the spread of kk [work outside the budget] (at the universities), the ratio of the cultivation of science has decreased, the values of science, higher education and economic activity have been mixed together. The mixing of activities with different goals and orders of value at the level of individuals and institutions has a contraselective effect. Virtually all the concepts consider a "clarification of profiles" to be important, designating a new place for science and the universities in the social transformation, "selecting out" the economic activities. But the proposals for a solution differ significantly.

The organizational and financing system received sharp criticism from several sides as well. The institutional separation of the universities and scientific research and the separation of applied research and the enterprises correspond to the Soviet model. As a result of hierarchical state guidance and centralized management an unhealthy enmity in the struggle for resources and social recognition developed between the universities and the research institutes.

Both the universities and the Academy and its institutes are hierarchic and bureaucratic, basically conservative organizations, corresponding to the system. The area is split up from the viewpoint of state guidance, the universities belong to various ministries, university scientific research is supervised and in part financed by the Academy, significant financing sources for the Academy institutes come through the OMFB.

Over time the financing system became increasingly disfunctional. The basically centralized, redistributive financing system is overly bureaucratic, due to the multiple redistributions, and the expenditures are difficult to evaluate. Because of the increasingly critical shortages

there were regroupings of central resources, institutional centralization of some of the research expenditures, taxation of contract income, and the development of complicated refinancing forms. There is agreement that "clear water must be poured in the glass," that the resources must be distinguished from one another in accordance with the goals and the financing system made democratic in accordance with a professional competitive interest system.

Citing the earlier professional and political contraselection a number of positions question whether the present leading stratum can be suitable to guide things further. The radical position demands a fast selection, according to the liberal view a change in the value system and the realization of competition will solve this problem, if over a somewhat longer run. A number of professional arguments were also voiced at the forum for a rethinking of the scientific qualification system. This is needed not only in order to end contraselection but also for the sake of making the degrees understandable internationally and to restore the function of the universities.

The research institutes lack the young generation, the professional replacements. Every tenth researcher spends a rather long time abroad and many depart permanently. This trend is a characterization of the possibility of being a success in Hungary; the departure of the experts will make questionable for a long time the intellectual revival of the country. The brain drain, as a danger to Hungarian scientific evolution, figured in a number of opinions.

The situation is critical not only in the universities and research institutes but also in regard to the industrial research and development activity which is increasingly important from the viewpoint of the economy. Even today enterprise research and development at the international level is almost completely missing. As a result of the decreasing orders and resources the industrial research institutes are on the verge of bankruptcy. Innovation activity is at a low level; the indicators of technical development in industry lag far behind the average for European countries.

The serious anomalies and tensions which characterize the entire area from the universities through scientific research to the enterprises can be attributed not only to the organizational conditions and the shortage economy environment but also to the government policy—or lack thereof—at all times. It is characteristic of centralized guidance that state intervention and guidance are too much and too little at the same time, whether there or not. Science policy was unchanged for 20 years and state technical development practice was represented only by designating developmental directions and priorities and by a redistribution of resources largely according to the interests of the large enterprises, and not by realizing economic policy goals.

In evaluating the situation there are substantial differences of view among the various parties, interest representation organs, institutions and experts only in this, that while the expert materials and the TDDSZ sharply criticize the hierarchical organizational and financing system and recommend fundamental changes, there are views, like that of the presidium of the Academy, which see hope for an improvement in operations while preserving the present institutional system.

The basic principles are virtually identical in the concepts pertaining to the future. And this, perhaps, is not only because the experts and interested parties developed each other's opinions within the framework of debates and committee work during the past year but also because they follow objectively from the conditions of the country and the direction of the epochal change.

The intellectual capacity of the country is of strategic significance from the viewpoint of a long-term economic revival. So university education, scientific research and technological development must be treated and developed in a stressed way. From the viewpoint of the competitiveness of the national economy these three areas are closely interdependent; from the government viewpoint they must be handled together, on the basis of a comprehensive strategy. The place, role, and function of the universities, of scientific research and of strategic research and development, or innovation, differ, so uniform government guidance means coordinated but different state roles in the several areas.

The present hierarchic dependencies and centralized financing forms which necessarily harm professional performance must be replaced by democratic mechanisms based on multilevel professional competition. The basic principle of operation is autonomy, self-government guidance, with which social control and strict professional competition and judgment will be realized. In accordance with this financing should take place through funds and foundations which will be handled by elected bodies and advisory boards instead of the channels of redistribution which cannot be tracked.

International openness, the goal of joining Europe, is of special significance in these areas. Only international competitiveness can be the measure of scientific research.

The universities must approach the European practice so that the knowledge obtained in them can be transferable and the diplomas acceptable. We must exploit the increasing international interest in Eastern Europe and the international contacts of research and development. The market for research capacity must be expanded.

The elements of the scattered institutional structure must be brought closer to one another. The universities and scientific research must be linked more closely; the universities must be made arenas for science and the research institutes must be made arenas for education. Research which is strategic from the economic viewpoint

must be organized with greater state responsibility into the interest sphere of the enterprises.

Legal operation requires regulation by law. The law should guarantee the freedom of scientific research.

These thoughts appeared in virtually every opinion and concept; in substance, of course, they did not mean the same things by them. At the same time the area is very broad, those taking positions emphasized or touched on different partial areas, but they did not completely overlap. So science policy and technology policy ideas more concrete than the above, based on a consensus, have not developed yet; the debates often descended into partial questions.

Scientific Research

Scientific research received a central place in the stand taken by the TDDSZ and in the expert materials prepared for the Science Policy Collegium. The TDDSZ considered it most important to separate research and development, science (here basic research) and undertakings. The task of science is to learn, create value and transmit it. A necessarily broad gap yawns between the cultivation of science at the international level and the technical level of an economy in crisis. A new situation must be created in which different orders of value guide scientific activity and economy oriented development. Scientific research should be organized in accordance with international norms, in an autonomous manner, on a principle of nonprofit management. Developmental research should be realized as an undertaking on a profit oriented basis.

With the development of new financing forms, economic regulators, and entrepreneurial possibilities the activities being organized on the basis of different orders of value, goals, and functions must be separated over the long run. We must start up mechanisms which give life to sharp professional and economic competition but work on different principles thus making possible the selection and separation of the different activities. The restructuring should be voluntary, based on the rational decisions of those affected.

Breaking up the present hierarchies and distribution of state resources through funds with professional competition and control are fundamental conditions for autonomy. The financing of science is primarily a state task; the ability of the budget to bear the burden determines the magnitude of this, but through foundation regulation private persons, enterprises, etc. must be encouraged to supplement these resources.

Strategic research (applied research) lies between basic research and development; a sharp dividing line cannot be drawn in either direction. But obviously the resources must be kept separate and the priorities, principles of evaluation and the economic goals to be attained must be made clear.

In the present period of economic crisis the values must be preserved; it must not be permitted that the values of science should become the victims of temporary difficulties.

Universities, Higher Education

The concepts pertaining to the universities were prepared on a commission from the Science Policy Collegium and for the Higher Education Forum. The chief thoughts of the two coinciding documents are the following.

The universities must go through a radical transformation so that they can fulfill the role needed in liquidating the economic backwardness and catching up with Europe. It must be recognized that higher education has a long range role in the capacity of the country, and that this is a strategic question in the economic policy sense.

The university should be a real universitas, an institution working on the basis of the logic of science. Scientific research should have a greater place in the life of the universities.

Instead of the hierarchic dependence the university should be autonomous, and its leading bodies should be elected (with the participation of the students too). The goal, content, and level of training should follow international trends. Competition among and evaluation by both students and instructors should aid an improvement of quality. This will be ensured by study freedom, a principle of subject and instructor selection, and by developing conditions for free student selection. The university does not instruct—the students pursue studies there.

The new mechanisms of financing should serve these principles as well. The system of state disbursement must be ended. The financing of the university should be from a number of sources, from the state budget, from support and tuition which can be won in competitions, etc. The tuition finances the work of the instructors, departments, and research institutes on the basis of the interest and value judgments of the students. Development of a suitable credit system is a condition for the introduction of tuition. The university is a nonprofit institution. Scientific research receives support by competitions with competitive conditions. For this reason it must be ensured that scientific research funds can be obtained by all researchers under the same conditions; the OTKA [National Scientific Research Fund] should be "at an equal distance from the universities and the research institutes."

A condition for catching up with Europe is that the number of university students should increase radically by two or three times (this applies to the ratio of day students as well) and the teaching of foreign languages should be made general. Language knowledge should be a condition for getting a diploma.

The universities must regain the right of scientific qualification. The lectureship and tutor system and the tradition of doctorate training must be restored. The single level training represents a backwardness of the university system; the research institutes must be gradually brought into the development of postgraduate training. The students in the institutes should be able to join in laboratory work, and the researchers should give courses in the universities.

Technology

The study prepared at the request of the Science Policy Collegium also deals with the tasks of technical development and technology policy but the OMFB as well summarized for the new government the guiding principles of progress. The documents, containing similar principles, emphasize the following.

Economic revival depends on improving the competitiveness of the enterprises and of the national economy. As long as the enterprises did not feel the challenge of market competition technical development was a matter of state administration and moved with state support along state preferences. Today the chief direction of state technology policy is development of research and the development of environmental influences instead of direct support of the enterprises. Giving life to the economy, building markets, a tax policy favoring innovation and infrastructural, informational and institutional support (banks, advice, organization and marketing networks) for the founding of small and medium enterprises are most important tools for an economic policy aimed at changing the industrial structure. The state aids technological development with purchase orders, by building enterprise contacts and with organizational and intermediary activities, and thus aids an improvement in competitiveness. Use of new technologies must be favored. The support for forming and starting up small enterprises oriented toward new technologies by providing an infrastructure, capital availablity, information, and favorable environmental conditions is an especially promising area.

We must realize a competition system in financing strategic research projects, strict competitive conditions, demanding results and an unambiguous clarification of goals (economic and professional). State sources must be used not only for R and D financing but also to expand the availability of capital.

Foreign capital will have a significant role in technical adaptation. The international opening should be manifested in encouraging the import of technology, in joining the large international (European) R and D programs and in the development of international cooperation. A condition for joining Europe is development of governmental institutions adapted to the European countries.

Institutions of Science

The closer we get to questions affecting vital interests the more alternative ideas there are and naturally the more debate and confrontation there are. In essence three characteristic opinions or interest groups have developed concerning the institutions of science.

The expert materials and the TDDSZ point in a similar direction, a liberal view according to which we must achieve a new model over a longer run not by destroying and reorganizing but rather by designating the direction of transformation and adopting a new order of values. The goals must be designated and adopted today and the possibilities for self-organization and transformation must be created. The restructuring can be started by breaking down the present hierarchical dependencies, ensuring legal possibilities for self-organization, and developing an operational and financing system which realizes a new order of values. Breaking down the dependencies means ending the supervisory functions of the Academy and of the Ministry of Culture. The autonomous universities and the research communities should be financed from state funds managed by elected boards. The financing of the infrastructure and of the research themes takes place in two ways, the latter by means of competitions with strict social controls (publicity).

The universities and scientific research sites (basic research) are nonprofit institutions in which the quality conduct of the basic activity must be ensured with suitable wages and technical provisions. The standard and method of selection should correspond to international practice; only professional factors should have a role in judging the competitions.

What does this view mean in regard to the present institutional system and the Academy?

The present form of the Academy was criticized from several sides, by the interest representation organs and by the experts. The present hierarchical structure conserves those operational mechanisms and financing forms which led to a confusion of value systems and the deterioration of conditions for and ratios of basic research. The mixing together of the three functions of the Academy—a scientific society, supervision of an institute network and state administrative type guidance (the OTKA) of science—means a survival of contraselection and lobbies, the further existence of centralized guidance and redistribution, and the university-Academy rivalry and hostility. The body of the Academy should continue to function as a society of scientists, independent of the institute network. By ending the guiding, supervisory function of the office the way will open for the self-organization, transformation, separation or combination of the institutes or their gathering into a loose interest representation association. The Academy, as a scientific society, should be an equal distance from the universities, should represent their interests in the same way as well.

In contrast to this the Presidium recommended, at the general meeting of the Academy last year and this, modernizing but maintaining the present organizational system. The two chief elements of the Academy's concept are a public body and its own property. Made independent of the state but maintaining its guidance of scientific life the body of the Academy would manage independently, the institutes would be not state property but rather Academy property. Modernization of guidance and financing would mean changing the functions of the office and increasing institute self-management. Development of the OTKA and the competitions system and broadening instructional and research cooperation with the universities are also desireable for the Academy. The leadership of the Academy sees in the preservation of the institute network, holding it together, not only a protection of its own position but also the protection of science.

Recently there have been sharp debates within the bodies of the Academy as well—for example in connection with the Academy law. The independence aspirations of the institutes are represented by the Council of Academy Research Institutes, formed a few months ago, as an interest representation organ.

The third position recommends a radical transformation and reorganization. The political arguments appear in this concept more sharply, and the proposal is nourished by the international example. A real democratization of operations cannot be expected from an elite chosen by political contraselection, to talk about improving the hierarchical fossil of the Academy is hopeless, power and the distribution of resources must be put in other hands. Agreeing with the basic principles (professional competition, financing by means of competitions, international competitiveness, etc.) they recommend creation of a new state organ, the National Science Foundation, instead of the Academy. The Academy would continue to function only as a society of scientists (as in the liberal concept). The present institute property of the Academy would become property of the NTA [National Science Foundation] and as a foundation it would also manage the OTKA and the research funds of the ministries. The basic idea of the NTA is deliberately linked to the American National Science Foundation, with the creation of a strict evaluation and competition system and social openness. The institutes would become loose federations of research groups where the director would have a managerial and not a science guidance task. In a monopolistic way the NTA would concentrate in one hand all the sources financing science.

For some reorganization also means a reorganization of the institutes and universities. The producing activity and the developmental sections must be separated off and put under the Ministry of Industry.

Reorganization is also mentioned as a solution in regard to basic research. There is a striking—fortunately not broad—opinion that scientific research must be attached to the universities, that the research groups and institutes must be transferred from the Academy to the universities.

The Role of the State

There is an extreme view according to which there is no money for science so technical development is the task of the enterprises, and the reviving market will solve this. The state should get out of these areas. In contrast to this the expert materials urge a transformation of but an intensive presence for the state role. Higher education, scientific research, and strategic development are long-term economic interests so the financing of them is primarily a state task. Instead of direct guidance the state should have a coordinating, financing role in these areas, supporting itself on the activity of the autonomous organizations. Due to the strategic importance of these areas there is a need to create a governmental organ which could develop a coordinated higher education, science and technology policy embracing all three strategic areas.

The experts recommend the creation of many institutions with different functions for financing and to take care of technology policy tasks. In addition to the funds and foundations with various purposes it would be useful to have many types of organizing and consulting, information and management, state or semistate organizations. In addition to its market building activity and encouraging undertakings the state should undertake a more effective role in technology transfer, should create a so-called bridge building institution.

Unclarified Points

I would be amazed if any of those affected or interested were satisfied by the above description of the views. Not only because the theme discussed and debated is very broad and the concepts partial but also because often we are talking about ill formulated views and values which figure as developed ideas. This cannot be otherwise, for the conditions for science, higher education or technical development are most unclear in a social and economic environment which has become uncertain in the past year. The concepts were built on uncertain expectations last year, in defense of professional, individual or institutional interests. Those studies which analyzed the status of science or technical development on behalf of a future government policy could start from international experiences and from the tensions and errors of Hungarian practice, but they could hardly predict the speed of the economic transformation or even less the political line of the new government after the change of system.

What are those things in which we, the participants in the debate, the organizations and experts affected, do not agree or understand differently?

The concept of autonomy. We mention it at different levels and with different content. Some imagine the desired autonomy at the level of the Academy, others at the level of the institutes and universities, many at the

level of research groups or university departments. There are plenty of political objections as well. Should one give autonomy while the old, so-called contraselected elite sits in the leadership? Will this not simply conserve the internal structures? With what mechanism can the conservative interests be moved out of their old positions?

Can autonomy have meaning without property? How will the market economy transformation and privatization affect this sphere? Will the universities become state property or the property of foundations? How would the interest of the Academy research institutes change if the Academy, instead of the state, were the owner? By what privatization procedure can institute or university research groups found economic undertakings?

In regard to new mechanisms for financing there is essentially full agreement in the question of professional competition and social control. But there is a professional debate in the question funds or foundations. The former is a source the filling of which, to a given level, is guaranteed by the founder (primarily the state). The latter is property the income from which ensures the financing of the foundation's goal. As a result of inflation and the budget deficit some doubt the credibility of a state guarantee while others, in the absence of a capital market, consider unrealistic the ability to segregate property ensuring sufficient income.

Many details of the university reform thinking are still debated also, such as the social conditions for tuition and a credit system, the social insurance system, and the wage system, and conditions, from the side of professors and secondary schools, for increasing the number of students. In regard to financing, for example, the relationship of personnel proportional, normative, infrastructural, and competition financing are unclear.

Many understand in different ways the linking of the universities and the research institutes, of instruction and science. The two sides see difficulties for cooperation in the willingness or preparedness of the other. Is the solution to put university departments into the research institutes or to transfer research groups to the universities? What forms of financing would support cooperation without reorganizations?

Separating out the economic undertakings is a goal in the reorganization of the research institutes. How and on what basis can one determine the magnitude of infrastructural services as long as the coexistence of science, and economic activity is still characteristic? Does the nonprofit management principle permit a scientific research institute to have an undertaking and turn profit therefrom to science? Can the value systems of science and entrepreneurship, can the two activities, be separated in such a way?

There are also doubts in connection with broadening the competitions system, because of negative experiences with the operation of the OTKA. On the one hand due to the need to use competition moneys to make up for maintenance cost deficits and on the other hand due to the lack of evaluation and real competition.

The question of scientific qualification was no less debated. It is more or less accepted that the universities have the right of qualification; the centralized solution, the TMB [Committee on Scientific Qualifications], must be abolished. Hungarian degrees cannot be understood in international scientific life. Which is desirable in the name of modernization, the Anglo-Saxon or the German system, the Ph. D. or the lectureship system?

By Way of Summary

I undertook to illuminate views connected with science, the university, and technology because I participated in the work of a number of expert committees, of the OMFB work group and of the TDDSZ, and I hope that there will be an opportunity for debate and detailed work in the future, that we will strive for a worthy formulation and confrontation of views and interests.

As I see it, in addition to the liberal and radical way of realizing new values and principles, there is also a conservative solution based on developed contacts, mechanisms, and interests. Strong organizational structures offered greater protection against the totalitarian state, and the organizations of science accomodated to this too. Both the idea of a radical reorganization and the conservative, preserving position contain a sort of etatist attitude, a sort of partisanship. The MTA [Hungarian Academy of Sciences], as state organ with a single center, brings to mind the ideal of enlightened absolutism, "We must work better and more wisely than heretofore." I see in the Academy concept not a defense of tradition (which in itself I would support) but rather the conviction of a generation (because there is generational tension) about the viability of a large organization in improving its bargaining positions with the state.

When reporting on the debate I have necessarily indicated my own position. I would like to emphasize that I have a dispute not only with the radical and conservative opinions but also with the procrastinating views which belittle the strategic significance of the area.

A liberal evolution can be successful only with a liberal government policy, and with a recognition of the significance of higher education, science and innovation. I consider the development of a unified science, technology and higher education policy by the government to be primary, a policy in which the magnitude and mechanisms of sources, of financing, and of the role, goals and priorities of the state are clarified. Today this area is dispersed from the government point of view, the thinking about it has not yet gone beyond the outlines of an earlier epoch. New values for government work must be developed and in accordance with this there must develop an adequate organizational structure reflecting the responsibility of the state. In regard to guidance and financing I see the only possibility for a long-term evolution in a breaking up of the hierarchies and dependencies, in a change in the role of the state and in a voluntary reorganization fitting the European structures starting along new lines of force. The present organizations and forms preserve those interests which led to a devaluation of the universities and of science, but reorganization in itself will not solve these problems either.

Foreign Broadcast Information Service (FBIS) and Joint Publications Research Service (JPRS) publications contain political, military, economic, environmental, and sociological news, commentary, and other information, as well as scientific and technical data and reports. All information has been obtained from foreign radio and television broadcasts, news agency transmissions, newspapers, books, and periodicals. Items generally are processed from the first or best available sources. It should not be inferred that they have been disseminated only in the medium, in the language, or to the area indicated. Items from foreign language sources are translated; those from English-language sources are transcribed. Except for excluding certain diacritics, FBIS renders personal names and place-names in accordance with the romanization systems approved for U.S. Government publications by the U.S. Board of Geographic Names.

Headlines, editorial reports, and material enclosed in brackets [ ] are supplied by FBIS/JPRS. Processing indicators such as [Text] or [Excerpts] in the first line of each item indicate how the information was processed from the original. Unfamiliar names rendered phonetically are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear from the original source but have been supplied as appropriate to the context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by the source. Passages in boldface or italics are as published.

SUBSCRIPTION/PROCUREMENT INFORMATION

The FBIS DAILY REPORT contains current news and information and is published Monday through Friday in eight volumes: China, East Europe, Soviet Union, East Asia, Near East & South Asia, Sub-Saharan Africa, Latin America, and West Europe. Supplements to the DAILY REPORTs may also be available periodically and will be distributed to regular DAILY REPORT subscribers. JPRS publications, which include approximately 50 regional, worldwide, and topical reports, generally contain less time-sensitive information and are published periodically.

Current DAILY REPORTs and JPRS publications are listed in *Government Reports Announcements* issued semimonthly by the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22161 and the *Monthly Catalog of U.S. Government Publications* issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

The public may subscribe to either hardcover or microfiche versions of the DAILY REPORTs and JPRS publications through NTIS at the above address or by calling (703) 487-4630. Subscription rates will be provided by NTIS upon request. Subscriptions are available outside the United States from NTIS or appointed foreign dealers. New subscribers should expect a 30-day delay in receipt of the first issue.

U.S. Government offices may obtain subscriptions to the DAILY REPORTs or JPRS publications (hardcover or microfiche) at no charge through their sponsoring organizations. For additional information or assistance, call FBIS, (202) 338-6735,or write to P.O. Box 2604, Washington, D.C. 20013. Department of Defense consumers are required to submit requests through appropriate command validation channels to DIA, RTS-2C, Washington, D.C. 20301. (Telephone: (202) 373-3771, Autovon: 243-3771.)

Back issues or single copies of the DAILY REPORTs and JPRS publications are not available. Both the DAILY REPORTs and the JPRS publications are on file for public reference at the Library of Congress and at many Federal Depository Libraries. Reference copies may also be seen at many public and university libraries throughout the United States.